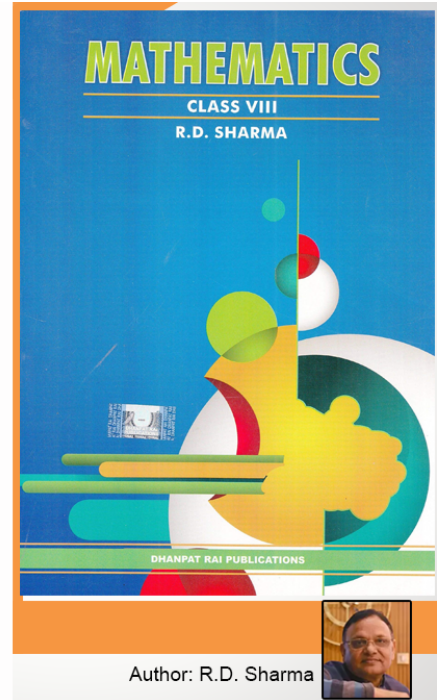


Class 8 - Chapter 6 Algebraic Expressions and Identities



RD Sharma Solutions for Class 8 Maths Chapter 6–Algebraic Expressions and Identities

Class 8: Maths Chapter 6 solutions. Complete Class 8 Maths Chapter 6 Notes.

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EXERCISE 6.1 PAGE NO: 6.2

1. Identify the terms, their coefficients for each of the following expressions:

(i) $7x^2yz - 5xy$

(ii) $x^2 + x + 1$

(iii) $3x^2y^2 - 5x^2y^2z^2 + z^2$

(iv) $9 - ab + bc - ca$

(v) $a/2 + b/2 - ab$

(vi) $0.2x - 0.3xy + 0.5y$

Solution:

(i) $7x^2yz - 5xy$

The given equation has two terms that are:

$7x^2yz$ and $-5xy$

The coefficient of $7x^2yz$ is 7

The coefficient of $-5xy$ is -5

(ii) $x^2 + x + 1$

The given equation has three terms that are:

x^2 , x , 1

The coefficient of x^2 is 1

The coefficient of x is 1

The coefficient of 1 is 1

(iii) $3x^2y^2 - 5x^2y^2z^2 + z^2$

The given equation has three terms that are:

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$3x^2y$, $-5x^2y^2z^2$ and z^2

The coefficient of $3x^2y$ is 3

The coefficient of $-5x^2y^2z^2$ is -5

The coefficient of z^2 is 1

(iv) $9 - ab + bc - ca$

The given equation has four terms that are:

9, -ab, bc, -ca

The coefficient of 9 is 9

The coefficient of -ab is -1

The coefficient of bc is 1

The coefficient of -ca is -1

(v) $a/2 + b/2 - ab$

The given equation has three terms that are:

$a/2$, $b/2$, -ab

The coefficient of $a/2$ is $1/2$

The coefficient of $b/2$ is $1/2$

The coefficient of -ab is -1

(vi) $0.2x - 0.3xy + 0.5y$

The given equation has three terms that are:

$0.2x$, $-0.3xy$, $0.5y$

The coefficient of $0.2x$ is 0.2

The coefficient of $-0.3xy$ is -0.3

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The coefficient of $0.5y$ is 0.5

2. Classify the following polynomials as monomials, binomials, trinomials. Which polynomials do not fit in any category?

(i) $x+y$

(ii) 1000

(iii) $x+x^2+x^3+x^4$

(iv) $7+a+5b$

(v) $2b-3b^2$

(vi) $2y-3y^2+4y^3$

(vii) $5x-4y+3x$

(viii) $4a-15a^2$

(ix) $xy+yz+zt+tx$

(x) pqr

(xi) p^2q+pq^2

(xii) $2p+2q$

Solution:

(i) $x+y$

The given expression contains two terms x and y

∴ It is Binomial

(ii) 1000

The given expression contains one term 1000

∴ It is Monomial

(iii) $x+x^2+x^3+x^4$

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The given expression contains four terms

∴ It belongs to none of the categories

(iv) $7+a+5b$

The given expression contains three terms

∴ It is Trinomial

(v) $2b-3b^2$

The given expression contains two terms

∴ It is Binomial

(vi) $2y-3y^2+4y^3$

The given expression contains three terms

∴ It is Trinomial

(vii) $5x-4y+3x$

The given expression contains three terms

∴ It is Trinomial

(viii) $4a-15a^2$

The given expression contains two terms

∴ It is Binomial

(ix) $xy + yz + zt + tx$

The given expression contains four terms

∴ It belongs to none of the categories

(x) pqr

The given expression contains one term

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∴ It is Monomial

(xi) $p^2q + pq^2$

The given expression contains two terms

∴ It is Binomial

(xii) $2p + 2q$

The given expression contains two terms

∴ It is Binomial

EXERCISE 6.2 PAGE NO: 6.5

1. Add the following algebraic expressions:

(i) $3a^2b, -4a^2b, 9a^2b$

(ii) $2/3a, 3/5a, -6/5a$

(iii) $4xy^2 - 7x^2y, 12x^2y - 6xy^2, -3x^2y + 5xy^2$

(iv) $3/2a - 5/4b + 2/5c, 2/3a - 7/2b + 7/2c, 5/3a + 5/2b - 5/4c$

(v) $11/2xy + 12/5y + 13/7x, -11/2y - 12/5x - 137xy$

(vi) $7/2x^3 - 1/2x^2 + 5/3, 3/2x^3 + 7/4x^2 - x + 1/3, 3/2x^2 - 5/2x - 2$

Solution:

(i) $3a^2b, -4a^2b, 9a^2b$

Let us add the given expression

$$3a^2b + (-4a^2b) + 9a^2b$$

$$3a^2b - 4a^2b + 9a^2b$$

$$8a^2b$$

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(ii) $\frac{2}{3}a, \frac{3}{5}a, -\frac{6}{5}a$

Let us add the given expression

$$\frac{2}{3}a + \frac{3}{5}a + (-\frac{6}{5}a)$$

$$\frac{2}{3}a + \frac{3}{5}a - \frac{6}{5}a$$

Let us take LCM for 3 and 5 which is 15

$$\frac{(2 \times 5)}{(3 \times 5)}a + \frac{(3 \times 3)}{(5 \times 3)}a - \frac{(6 \times 3)}{(5 \times 3)}a$$

$$\frac{10}{15}a + \frac{9}{15}a - \frac{18}{15}a$$

$$\frac{(10a+9a-18a)}{15}$$

$$\frac{a}{15}$$

(iii) $4xy^2 - 7x^2y, 12x^2y - 6xy^2, -3x^2y + 5xy^2$

Let us add the given expression

$$4xy^2 - 7x^2y + 12x^2y - 6xy^2 - 3x^2y + 5xy^2$$

Upon rearranging

$$12x^2y - 3x^2y - 7x^2y - 6xy^2 + 5xy^2 + 4xy^2$$

$$3xy^2 + 2x^2y$$

(iv) $\frac{3}{2}a - \frac{5}{4}b + \frac{2}{5}c, \frac{2}{3}a - \frac{7}{2}b + \frac{7}{2}c, \frac{5}{3}a + \frac{5}{2}b - \frac{5}{4}c$

Let us add the given expression

$$\frac{3}{2}a - \frac{5}{4}b + \frac{2}{5}c + \frac{2}{3}a - \frac{7}{2}b + \frac{7}{2}c + \frac{5}{3}a + \frac{5}{2}b - \frac{5}{4}c$$

Upon rearranging

$$\frac{3}{2}a + \frac{2}{3}a + \frac{5}{3}a - \frac{5}{4}b - \frac{7}{2}b + \frac{5}{2}b + \frac{2}{5}c + \frac{7}{2}c - \frac{5}{4}c$$

By taking LCM for (2 and 3 is 6), (4 and 2 is 4), (5, 2 and 4 is 20)

$$\frac{(9a+4a+10a)}{6} + \frac{(-5b-14b+10b)}{4} + \frac{(8c+70c-25c)}{20}$$

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$$23a/6 - 9b/4 + 53c/20$$

(v) $11/2xy + 12/5y + 13/7x, -11/2y - 12/5x - 13/7xy$

Let us add the given expression

$$11/2xy + 12/5y + 13/7x + -11/2y - 12/5x - 13/7xy$$

Upon rearranging

$$11/2xy - 13/7xy + 13/7x - 12/5x + 12/5y - 11/2y$$

By taking LCM for (2 and 7 is 14), (7 and 5 is 35), (5 and 2 is 10)

$$(11xy-12xy)/14 + (65x-84x)/35 + (24y-55y)/10$$

$$51xy/14 - 19x/35 - 31y/10$$

(vi) $7/2x^3 - 1/2x^2 + 5/3, 3/2x^3 + 7/4x^2 - x + 1/3, 3/2x^2 - 5/2x - 2$

Let us add the given expression

$$7/2x^3 - 1/2x^2 + 5/3 + 3/2x^3 + 7/4x^2 - x + 1/3 + 3/2x^2 - 5/2x - 2$$

Upon rearranging

$$7/2x^3 + 3/2x^3 - 1/2x^2 + 7/4x^2 + 3/2x^2 - x - 5/2x + 5/3 + 1/3 - 2$$

$$10/2x^3 + 11/4x^2 - 7/2x + 0/6$$

$$5x^3 + 11/4x^2 - 7/2x$$

2. Subtract:

(i) $-5xy$ from $12xy$

(ii) $2a^2$ from $-7a^2$

(iii) $2a-b$ from $3a-5b$

(iv) $2x^3 - 4x^2 + 3x + 5$ from $4x^3 + x^2 + x + 6$

(v) $2/3y^3 - 2/7y^2 - 5$ from $1/3y^3 + 5/7y^2 + y - 2$

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(vi) $3/2x - 5/4y - 7/2z$ from $2/3x + 3/2y - 4/3z$

(vii) $x^2y - 4/5xy^2 + 4/3xy$ from $2/3x^2y + 3/2xy^2 - 1/3xy$

(viii) $ab/7 - 35/3bc + 6/5ac$ from $3/5bc - 4/5ac$

Solution:

(i) $-5xy$ from $12xy$

Let us subtract the given expression

$$12xy - (-5xy)$$

$$5xy + 12xy$$

$$17xy$$

(ii) $2a^2$ from $-7a^2$

Let us subtract the given expression

$$(-7a^2) - 2a^2$$

$$-7a^2 - 2a^2$$

$$-9a^2$$

(iii) $2a-b$ from $3a-5b$

Let us subtract the given expression

$$(3a - 5b) - (2a - b)$$

$$3a - 5b - 2a + b$$

$$a - 4b$$

(iv) $2x^3 - 4x^2 + 3x + 5$ from $4x^3 + x^2 + x + 6$

Let us subtract the given expression

$$(4x^3 + x^2 + x + 6) - (2x^3 - 4x^2 + 3x + 5)$$

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$$4x^3 + x^2 + x + 6 - 2x^3 + 4x^2 - 3x - 5$$

$$2x^3 + 5x^2 - 2x + 1$$

(v) $2/3y^3 - 2/7y^2 - 5$ from $1/3y^3 + 5/7y^2 + y - 2$

Let us subtract the given expression

$$1/3y^3 + 5/7y^2 + y - 2 - 2/3y^3 + 2/7y^2 + 5$$

Upon rearranging

$$1/3y^3 - 2/3y^3 + 5/7y^2 + 2/7y^2 + y - 2 + 5$$

By grouping similar expressions we get,

$$-1/3y^3 + 7/7y^2 + y + 3$$

$$-1/3y^3 + y^2 + y + 3$$

(vi) $3/2x - 5/4y - 7/2z$ from $2/3x + 3/2y - 4/3z$

Let us subtract the given expression

$$2/3x + 3/2y - 4/3z - (3/2x - 5/4y - 7/2z)$$

Upon rearranging

$$2/3x - 3/2x + 3/2y + 5/4y - 4/3z + 7/2z$$

By grouping similar expressions we get,

LCM for (3 and 2 is 6), (2 and 4 is 4), (3 and 2 is 6)

$$(4x-9x)/6 + (6y+5y)/4 + (-8z+21z)/6$$

$$-5x/6 + 11y/4 + 13z/6$$

(vii) $x^2y - 4/5xy^2 + 4/3xy$ from $2/3x^2y + 3/2xy^2 - 1/3xy$

Let us subtract the given expression

$$2/3x^2y + 3/2xy^2 - 1/3xy - (x^2y - 4/5xy^2 + 4/3xy)$$

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Upon rearranging

$$2/3x^2y - x^2y + 3/2xy^2 + 4/5xy^2 - 1/3xy - 4/3xy$$

By grouping similar expressions we get,

LCM for (3 and 1 is 3), (2 and 5 is 10), (3 and 3 is 3)

$$-1/3x^2y + 23/10xy^2 - 5/3xy$$

(viii) $ab/7 - 35/3bc + 6/5ac$ from $3/5bc - 4/5ac$

Let us subtract the given expression

$$3/5bc - 4/5ac - (ab/7 - 35/3bc + 6/5ac)$$

Upon rearranging

$$3/5bc + 35/3bc - 4/5ac - 6/5ac - ab/7$$

By grouping similar expressions we get,

LCM for (5 and 3 is 15), (5 and 5 is 5)

$$(9bc+175bc)/15 + (-4ac-6ac)/5 - ab/7$$

$$184bc/15 + -10ac/5 - ab/7$$

$$- ab/7 + 184bc/15 - 2ac$$

3. Take away:

(i) $6/5x^2 - 4/5x^3 + 5/6 + 3/2x$ from $x^3/3 - 5/2x^2 + 3/5x + 1/4$

(ii) $5a^2/2 + 3a^3/2 + a/3 - 6/5$ from $1/3a^3 - 3/4a^2 - 5/2$

(iii) $7/4x^3 + 3/5x^2 + 1/2x + 9/2$ from $7/2 - x/3 - x^2/5$

(iv) $y^3/3 + 7/3y^2 + 1/2y + 1/2$ from $1/3 - 5/3y^2$

(v) $2/3ac - 5/7ab + 2/3bc$ from $3/2ab - 7/4ac - 5/6bc$

Solution:

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(i) $6/5x^2 - 4/5x^3 + 5/6 + 3/2x$ from $x^3/3 - 5/2x^2 + 3/5x + 1/4$

Let us subtract the given expression

$$1/3x^3 - 5/2x^2 + 3/5x + 1/4 - (6/5x^2 - 4/5x^3 + 5/6 + 3/2x)$$

Upon rearranging

$$1/3x^3 + 4/5x^3 - 5/2x^2 - 6/5x^2 + 3/5x - 3/2x + 1/4 - 5/6$$

By grouping similar expressions we get,

LCM for (3 and 5 is 15), (2 and 5 is 10), (5 and 2 is 10), (4 and 6 is 24)

$$17/15x^3 - 37/10x^2 - 9/10x - 14/24$$

$$17/15x^3 - 37/10x^2 - 9/10x - 7/12$$

(ii) $5a^2/2 + 3a^3/2 + a/3 - 6/5$ from $1/3a^3 - 3/4a^2 - 5/2$

Let us subtract the given expression

$$1/3a^3 - 3/4a^2 - 5/2 - (5/2a^2 + 3/2a^3 + a/3 - 6/5)$$

Upon rearranging

$$1/3a^3 - 3/2a^3 - 3/4a^2 - 5/2a^2 - a/3 - 5/2 + 6/5$$

By grouping similar expressions we get,

LCM for (3 and 2 is 6), (4 and 2 is 4), (2 and 5 is 10)

$$(2a^3 - 9a^3)/6 - (3a^2 + 10a^2)/4 - a/3 + (-25+12)/10$$

$$-7/6a^3 - 13/4a^2 - a/3 - 13/10$$

(iii) $7/4x^3 + 3/5x^2 + 1/2x + 9/2$ from $7/2 - x/3 - x^2/5$

Let us subtract the given expression

$$7/2 - x/3 - 1/5x^2 - (7/4x^3 + 3/5x^2 + 1/2x + 9/2)$$

Upon rearranging

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$$-7/4x^3 - 1/5x^2 - 3/5x^2 - x/3 - x/2 + 7/2 - 9/2$$

By grouping similar expressions we get,

LCM for (3 and 2 is 6)

$$-7/4x^3 - 4/5x^2 - (2x-3x)/6 + (7-9)/2$$

$$-7/4x^3 - 4/5x^2 - 5/6x - 1$$

(iv) $y^3/3 + 7/3y^2 + 1/2y + 1/2$ from $1/3 - 5/3y^2$

Let us subtract the given expression

$$1/3 - 5/3y^2 - (1/3y^3 + 7/3y^2 + 1/2y + 1/2)$$

Upon rearranging

$$-1/3y^3 - 5/3y^2 - 7/3y^2 - 1/2y + 1/3 - 1/2$$

By grouping similar expressions we get,

LCM for (3 and 3 is 3), (3 and 2 is 6)

$$-1/3y^3 + (-5y^2 - 7y^2)/3 - 1/2y + (2-3)/6$$

$$-1/3y^3 - 12/3y^2 - 1/2y - 1/6$$

(v) $2/3ac - 5/7ab + 2/3bc$ from $3/2ab - 7/4ac - 5/6bc$

Let us subtract the given expression

$$3/2ab - 7/4ac - 5/6bc - (2/3ac - 5/7ab + 2/3bc)$$

Upon rearranging

$$3/2ab + 5/7ab - 7/4ac - 2/3ac - 5/6bc - 2/3bc$$

By grouping similar expressions we get,

LCM for (2 and 7 is 14), (4 and 3 is 12), (6 and 3 is 6)

$$(21ab+10ab)/14 - (21ac-8ac)/12 - (5bc-4bc)/6$$

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$$31/14ab - 29/12ac - 3/2bc$$

4. Subtract $3x - 4y - 7z$ from the sum of $x - 3y + 2z$ and $-4x + 9y - 11z$.

Solution:

The sum of $x - 3y + 2z$ and $-4x + 9y - 11z$ is

$$(x - 3y + 2z) + (-4x + 9y - 11z)$$

Upon rearranging

$$x - 4x - 3y + 9y + 2z - 11z$$

$$-3x + 6y - 9z$$

Now, Let us subtract the given expression from $-3x + 6y - 9z$

$$(-3x + 6y - 9z) - (3x - 4y - 7z)$$

Upon rearranging

$$-3x - 3x + 6y + 4y - 9z + 7z$$

$$-6x + 10y - 2z$$

5. Subtract the sum of $3l - 4m - 7n^2$ and $2l + 3m - 4n^2$ from the sum of $9l + 2m - 3n^2$ and $-3l + m + 4n^2$

Solution:

Sum of $3l - 4m - 7n^2$ and $2l + 3m - 4n^2$

$$3l - 4m - 7n^2 + 2l + 3m - 4n^2$$

Upon rearranging

$$3l + 2l - 4m + 3m - 7n^2 - 4n^2$$

$$5l - m - 11n^2 \dots\dots\dots\text{equation (1)}$$

Sum of $9l + 2m - 3n^2$ and $-3l + m + 4n^2$

$$9l + 2m - 3n^2 + (-3l + m + 4n^2)$$

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Upon rearranging

$$9l - 3l + 2m + m - 3n^2 + 4n^2$$

$$6l + 3m + n^2 \dots\dots\dots\text{equation (2)}$$

Let us subtract equation (i) from (ii), we get

$$6l + 3m + n^2 - (5l - m - 11n^2)$$

Upon rearranging

$$6l - 5l + 3m + m + n^2 + 11n^2$$

$$l + 4m + 12n^2$$

6. Subtract the sum of $2x - x^2 + 5$ and $-4x - 3 + 7x^2$ from 5.

Solution:

Sum of $2x - x^2 + 5$ and $-4x - 3 + 7x^2$ is

$$2x - x^2 + 5 + (-4x - 3 + 7x^2)$$

$$2x - x^2 + 5 - 4x - 3 + 7x^2$$

Upon rearranging

$$-x^2 + 7x^2 + 2x - 4x + 5 - 3$$

$$6x^2 - 2x + 2 \dots\dots\dots\text{equation (i)}$$

Let us subtract equation (i) from 5 we get,

$$5 - (6x^2 - 2x + 2)$$

$$5 - 6x^2 + 2x - 2$$

$$3 + 2x - 6x^2$$

7. Simplify each of the following:

(i) $x^2 - 3x + 5 - \frac{1}{2}(3x^2 - 5x + 7)$

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(ii) $[5 - 3x + 2y - (2x - y)] - (3x - 7y + 9)$

(iii) $11/2x^2y - 9/4xy^2 + 1/4xy - 1/14y^2x + 1/15yx^2 + 1/2xy$

(iv) $(1/3y^2 - 4/7y + 11) - (1/7y - 3 + 2y^2) - (2/7y - 2/3y^2 + 2)$

(v) $-1/2a^2b^2c + 1/3ab^2c - 1/4abc^2 - 1/5cb^2a^2 + 1/6cb^2a - 1/7c^2ab + 1/8ca^2b$

Solution:

(i) $x^2 - 3x + 5 - 1/2(3x^2 - 5x + 7)$

Upon rearranging

$$x^2 - 3/2x^2 - 3x + 5/2x + 5 - 7/2$$

By grouping similar expressions we get,

LCM for (1 and 2 is 2)

$$(2x^2 - 3x^2)/2 - (6x + 5x)/2 + (10-7)/2$$

$$-1/2x^2 - 1/2x + 3/2$$

(ii) $[5 - 3x + 2y - (2x - y)] - (3x - 7y + 9)$

$$5 - 3x + 2y - 2x + y - 3x + 7y - 9$$

Upon rearranging

$$- 3x - 2x - 3x + 2y + y + 7y + 5 - 9$$

By grouping similar expressions we get,

$$-8x + 10y - 4$$

(iii) $11/2x^2y - 9/4xy^2 + 1/4xy - 1/14y^2x + 1/15yx^2 + 1/2xy$

Upon rearranging

$$11/2x^2y + 1/15x^2y - 9/4xy^2 - 1/14xy^2 + 1/4xy + 1/2xy$$

By grouping similar expressions we get,

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LCM for (2 and 15 is 30), (4 and 14 is 56), (4 and 2 is 4)

$$(165x^2y + 2x^2y)/30 + (-126xy^2 - 4xy^2)/56 + (xy + 2xy)/4$$

$$167/30x^2y - 130/56xy^2 + 3/4xy$$

$$167/30x^2y - 65/28xy^2 + 3/4xy$$

$$(iv) (1/3y^2 - 4/7y + 11) - (1/7y - 3 + 2y^2) - (2/7y - 2/3y^2 + 2)$$

Upon rearranging

$$1/3y^2 - 2y^2 - 2/3y^2 - 4/7y - 1/7y - 2/7y + 11 + 3 - 2$$

By grouping similar expressions we get,

LCM for (3, 1 and 3 is 3), (7, 7 and 7 is 7)

$$(y^2 - 6y^2 + 2y^2)/3 - (4y - y - 2y)/7 + 12$$

$$-3/3y^2 - 7/7y + 12$$

$$-y^2 - y + 12$$

$$(v) -1/2a^2b^2c + 1/3ab^2c - 1/4abc^2 - 1/5cb^2a^2 + 1/6cb^2a - 1/7c^2ab + 1/8ca^2b$$

Upon rearranging

$$-1/2a^2b^2c - 1/5a^2b^2c + 1/3ab^2c + 1/6ab^2c - 1/4abc^2 - 1/7abc^2 + 1/8a^2bc$$

By grouping similar expressions we get,

LCM for (2 and 5 is 10), (3 and 6 is 6), (4 and 7 is 28)

$$-7/10a^2b^2c + 1/2ab^2c - 11/28abc^2 + 1/8a^2bc$$

EXERCISE 6.3 PAGE NO: 6.13

Find each of the following products:

1. $5x^2 \times 4x^3$

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Solution:

Let us simplify the given expression

$$5 \times x \times x \times 4 \times x \times x \times x$$

$$5 \times 4 \times x^{1+1+1+1+1}$$

$$20 \times x^5$$

$$20x^5$$

2. $-3a^2 \times 4b^4$

Solution:

Let us simplify the given expression

$$-3 \times a^2 \times 4 \times b^4$$

$$-12 \times a^2 \times b^4$$

$$-12a^2b^4$$

3. $(-5xy) \times (-3x^2yz)$

Solution:

Let us simplify the given expression

$$(-5) \times (-3) \times x \times x^2 \times y \times y \times z$$

$$15 \times x^{1+2} \times y^{1+1} \times z$$

$$15x^3y^2z$$

4. $1/2xy \times 2/3x^2yz^2$

Solution:

Let us simplify the given expression

$$1/2 \times 2/3 \times x \times x^2 \times y \times y \times z^2$$

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$$1/3 \times x^{1+2} \times y^{1+1} \times z^2$$

$$1/3x^3y^2z^2$$

5. $(-7/5xy^2z) \times (13/3x^2yz^2)$

Solution:

Let us simplify the given expression

$$-7/5 \times 13/3 \times x \times x^2 \times y^2 \times y \times z \times z^2$$

$$-91/15 \times x^{1+2} \times y^{2+1} \times z^{1+2}$$

$$-91/15x^3y^3z^3$$

6. $(-24/25x^3z) \times (-15/16xz^2y)$

Solution:

Let us simplify the given expression

$$-24/25 \times -15/16 \times x^3 \times x \times z \times z^2 \times y$$

$$18/20 \times x^{3+1} \times z^{1+2} \times y$$

$$9/10x^4z^3y$$

7. $(-1/27a^2b^2) \times (9/2a^3b^2c^2)$

Solution:

Let us simplify the given expression

$$-1/27 \times 9/2 \times a^2 \times a^3 \times b^2 \times b^2 \times c^2$$

$$-1/6 \times a^{2+3} \times b^{2+2} \times c^2$$

$$-1/6a^5b^4c^2$$

8. $(-7xy) \times (1/4x^2yz)$

Solution:

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Let us simplify the given expression

$$-7 \times \frac{1}{4} \times x \times y \times x^2 \times y \times z$$

$$-\frac{7}{4} \times x^{1+2} \times y^{1+1} \times z$$

$$-\frac{7}{4}x^3y^2z$$

9. $(7ab) \times (-5ab^2c) \times (6abc^2)$

Solution:

Let us simplify the given expression

$$7 \times -5 \times 6 \times a \times a \times a \times b \times b^2 \times b \times c \times c^2$$

$$210 \times a^{1+1+1} \times b^{1+2+1} \times c^{1+2}$$

$$210a^3b^4c^3$$

10. $(-5a) \times (-10a^2) \times (-2a^3)$

Solution:

Let us simplify the given expression

$$(-5) \times (-10) \times (-2) \times a \times a^2 \times a^3$$

$$-100 \times a^{1+2+3}$$

$$-100a^6$$

11. $(-4x^2) \times (-6xy^2) \times (-3yz^2)$

Solution:

Let us simplify the given expression

$$(-4) \times (-6) \times (-3) \times x^2 \times x \times y^2 \times y \times z^2$$

$$-72 \times x^{2+1} \times y^{2+1} \times z^2$$

$$-72x^3y^3z^2$$

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12. $(-2/7a^4) \times (-3/4a^2b) \times (-14/5b^2)$

Solution:

Let us simplify the given expression

$$-2/7 \times -3/4 \times -14/5 \times a^4 \times a^2 \times b \times b^2$$

$$-6/10 \times a^{4+2} \times b^{1+2}$$

$$-3/5a^6b^3$$

13. $(7/9ab^2) \times (15/7ac^2b) \times (-3/5a^2c)$

Solution:

Let us simplify the given expression

$$7/9 \times 15/7 \times -3/5 \times a \times a \times a^2 \times b^2 \times b \times c^2 \times c$$

$$-a^{1+1+2} \times b^{2+1} \times c^{2+1}$$

$$-a^4b^3c^3$$

14. $(4/3u^2vw) \times (-5uvw^2) \times (1/3v^2wu)$

Solution:

Let us simplify the given expression

$$4/3 \times -5 \times 1/3 \times u^2 \times u \times u \times v \times v \times v^2 \times w \times w^2 \times w$$

$$-20/9 \times u^{2+1+1} \times v^{1+1+2} \times w^{1+2+1}$$

$$-20/9u^4v^4w^4$$

15. $(0.5x) \times (1/3xy^2z^4) \times (24x^2yz)$

Solution:

Let us simplify the given expression

$$0.5 \times 1/3 \times 24 \times x \times x \times x \times y^2 \times y \times x^2 \times z^4 \times z$$

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$$12/3 \times x^{1+1+2} \times y^{2+1} \times z^{4+1}$$

$$4x^4 \times y^3 \times z^5$$

$$4x^4y^3z^5$$

16. $(4/3pq^2) \times (-1/4p^2r) \times (16p^2q^2r^2)$

Solution:

Let us simplify the given expression

$$4/3 \times 1/4 \times 16 \times p \times p^2 \times p^2 \times q^2 \times q^2 \times r \times r^2$$

$$-16/3 \times p^{1+2+2} \times q^{2+2} \times r^{1+2}$$

$$-16/3p^5q^4r^3$$

17. $(2.3xy) \times (0.1x) \times (0.16)$

Solution:

Let us simplify the given expression

$$2.3 \times 0.1 \times 0.16 \times x \times x \times y$$

$$0.0368 \times x^{1+1} \times y$$

$$0.0368x^2y$$

Express each of the following products as a monomials and verify the result in each case for x=1:

18. $(3x) \times (4x) \times (-5x)$

Solution:

Let us simplify the given expression

$$3 \times 4 \times -5 \times x \times x \times x$$

$$-60 \times x^{1+1+1}$$

$$-60x^3$$

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Verification

$$\text{LHS} = (3 \times 1) \times (4 \times 1) \times (-5 \times 1)$$

$$= 3 \times 4 \times -5$$

$$= -60$$

$$\text{RHS} = -60 (1)^3 = -60$$

Therefore, LHS = RHS.

19. $(4x^2) \times (-3x) \times (4/5x^3)$

Solution:

Let us simplify the given expression

$$4 \times -3 \times 4/5 \times x^2 \times x \times x^3$$

$$-48/5 \times x^{2+1+3}$$

$$-48/5x^6$$

Verification

$$\text{LHS} = 4 \times 1^2 \times -3 \times 1 \times 4/5 \times 1^3$$

$$= -48/5$$

$$\text{RHS} = -48/5 \times 1^6 = -48/5$$

Therefore, LHS = RHS.

20. $(5x^4) \times (x^2)^3 \times (2x)^2$

Solution:

Let us simplify the given expression

$$5 \times x^4 \times x^6 \times 4 \times x^2$$

$$5 \times 4 \times x^4 \times x^6 \times x^2$$

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$$20 \times x^{4+6+2}$$

$$20x^{12}$$

Verification

$$\text{LHS} = (5 \times 1^4) \times (1^2)^3 \times (2 \times 1)^2$$

$$= 5 \times 4$$

$$= 20$$

$$\text{RHS} = 20 \times 1^{12} = 20$$

Therefore, LHS = RHS.

21. $(x^2)^3 \times (2x) \times (-4x) \times (5)$

Solution:

Let us simplify the given expression

$$x^6 \times 2 \times x \times -4 \times x \times 5$$

$$2 \times -4 \times 5 \times x^6 \times x \times x$$

$$-40 \times x^{6+1+1}$$

$$-40x^8$$

Verification

$$\text{LHS} = (1^2)^3 \times (2 \times 1) \times (-4 \times 1) \times 5$$

$$= -40$$

$$\text{RHS} = -40 \times 1^8 = -40$$

Therefore, LHS = RHS.

22. Write down the product of $-8x^2y^6$ and $-20xy$ verify the product for $x = 2.5$, $y = 1$

Solution:

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Let us simplify the given expression

$$-8 \times -20 \times x^2 \times x \times y^6 \times y$$

$$160 \times x^{2+1} \times y^{6+1}$$

$$160x^3y^7$$

Now let us verify when, $x = 2.5$ and $y = 1$

For $160x^3y^7$

$$160 (2.5)^3 \times (1)^7$$

$$160 \times 15.625$$

$$2500$$

For $-8x^2y^6$ and $-20xy$

$$-8 \times 2.5^2 \times 1^6 \times -20 \times 1 \times 2.5$$

$$2500$$

Hence, the given expression is verified.

23. Evaluate $(3.2x^6y^3) \times (2.1x^2y^2)$ when $x = 1$ and $y = 0.5$

Solution:

Let us simplify the given expression

$$3.2 \times 2.1 \times x^6 \times x^2 \times y^3 \times y^2$$

$$6.72 \times x^{6+2} \times y^{3+2}$$

$$6.72x^8y^5$$

Now let us substitute when, $x = 1$ and $y = 0.5$

For $6.72x^8y^5$

$$6.72 \times 1^8 \times 0.5^5$$

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0.21

24. Find the value of $(5x^6) \times (-1.5x^2y^3) \times (-12xy^2)$ when $x = 1$, $y = 0.5$

Solution:

Let us simplify the given expression

$$5 \times -1.5 \times -12 \times x^6 \times x^2 \times x \times y^3 \times y^2$$

$$90 \times x^{6+2+1} \times y^{3+2}$$

$$90x^9y^5$$

Now let us substitute when, $x = 1$ and $y = 0.5$

For $90x^9y^5$

$$90 \times (1)^9 \times (0.5)^5$$

$$2.8125$$

$$45/16$$

25. Evaluate $(2.3a^5b^2) \times (1.2a^2b^2)$ when $a = 1$ and $b = 0.5$

Solution:

Let us simplify the given expression

$$2.3a^5b^2 \times 1.2a^2b^2$$

$$2.3 \times 1.2 \times a^5 \times a^2 \times b^2 \times b^2$$

$$2.76 \times a^{5+2} \times b^{2+2}$$

$$2.76a^7b^4$$

Now let us substitute when, $a = 1$ and $b = 0.5$

For $2.76 a^7 b^4$

$$2.76 (1)^7 (0.5)^4$$

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$$2.76 \times 1 \times 0.0025$$

$$0.1725$$

$$6.9/40$$

26. Evaluate $(-8x^2y^6) \times (-20xy)$ for $x = 2.5$ and $y = 1$

Solution:

Let us simplify the given expression

$$-8 \times -20 \times x^2 \times x \times y^6 \times y$$

$$160x^{2+1}y^{6+1}$$

$$160x^3y^7$$

Now let us substitute when, $x = 2.5$ and $y = 1$

$$160x^3y^7$$

$$160 \times (2.5)^3 \times (1)^7$$

$$2500$$

Express each of the following products as a monomials and verify the result for $x = 1$, $y = 2$:

27. $(-xy^3) \times (yx^3) \times (xy)$

Solution:

Let us simplify the given expression

$$-x \times y^3 \times y \times x^3 \times x \times y$$

$$-x^{1+3+1} \times y^{3+1+1}$$

$$-x^5y^5$$

Now let us substitute when, $x = 1$ and $y = 2$

$$-x^5y^5$$

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$$-1^5 \times 2^5$$

$$-32$$

28. $(1/8x^2y^4) \times (1/4x^4y^2) \times (xy) \times 5$

Solution:

Let us simplify the given expression

$$1/8 \times 1/4 \times 5 \times x^2 \times x^4 \times x \times y^4 \times y^2 \times y$$

$$5/32 \times x^{2+4+1} \times y^{4+2+1}$$

$$5/32x^7y^7$$

Now let us substitute when, $x = 1$ and $y = 2$

$$5/32 \times 1^7 \times 2^7$$

$$5/32 \times 128$$

$$5 \times 4$$

$$20$$

29. $(2/5a^2b) \times (-15b^2ac) \times (-1/2c^2)$

Solution:

Let us simplify the given expression

$$2/5 \times -15 \times -1/2 \times a^2 \times a \times b \times b^2 \times c \times c^2$$

$$3 \times a^{2+1} \times b^{1+2} \times c^{1+2}$$

$$3a^3b^3c^3$$

30. $(-4/7a^2b) \times (-2/3b^2c) \times (-7/6c^2a)$

Solution:

Let us simplify the given expression

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$$-4/7 \times -2/3 \times -7/6 \times a^2 \times a \times b \times b^2 \times c \times c^2$$

$$-4/9 \times a^{2+1} \times b^{2+1} \times c^{1+2}$$

$$-4/9a^3b^3c^3$$

31. $(4/9abc^3) \times (-27/5a^3b^2) \times (-8b^3c)$

Solution:

Let us simplify the given expression

$$4/9 \times -27/5 \times -8 \times a \times a^3 \times b \times b^2 \times b^3 \times c^3 \times c$$

$$96/5 \times a^{1+3} \times b^{1+2+3} \times c^{3+1}$$

$$96/5a^4b^6c^4$$

Evaluate each of the following when $x = 2$, $y = -1$.

32. $(2xy) \times (x^2y/4) \times (x^2) \times (y^2)$

Solution:

Let us simplify the given expression

$$2 \times 1/4 \times x \times x^2 \times x^2 \times y \times y^2 \times y$$

$$1/2x^{1+2+2}y^{1+2+1}$$

$$1/2x^5y^4$$

Now let us substitute when, $x = 2$ and $y = -1$

For $1/2x^5y^4$

$$1/2 \times (2)^5 \times (-1)^4$$

$$1/2 \times 32 \times 1$$

$$16$$

33. $(3/5x^2y) \times (-15/4xy^2) \times (7/9x^2y^2)$

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Solution:

Let us simplify the given expression

$$3/5 \times -15/4 \times 7/9 \times x^2 \times x \times x^2 \times y \times y^2 \times y^2$$

$$-7/4 \times x^{2+1+2} \times y^{1+2+2}$$

$$7/4x^5y^5$$

Now let us substitute when, $x = 2$ and $y = -1$

For $-7/4x^5y^5$

$$-7/4 \times (2)^5 (-1)^5$$

$$-7/4 \times 32 \times -1$$

$$56$$

EXERCISE 6.4 PAGE NO: 6.21

Find the following products:

1. $2a^3(3a + 5b)$

Solution:

Let us simplify the given expression

$$2a^3(3a + 5b)$$

$$(2a^3 \times 3a) + (2a^3 \times 5b)$$

$$6a^{3+1} + 10a^3b$$

$$6a^4 + 10a^3b$$

2. $-11a(3a + 2b)$

Solution:

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Let us simplify the given expression

$$-11a(3a + 2b)$$

$$(-11a \times 3a) + (-11a \times 2b)$$

$$-33a^2 - 22ab$$

3. $-5a(7a - 2b)$

Solution:

Let us simplify the given expression

$$-5a(7a - 2b)$$

$$(-5a \times 7a) - (-5a \times 2b)$$

$$-35a^2 + 10ab$$

4. $-11y^2(3y + 7)$

Solution:

Let us simplify the given expression

$$-11y^2(3y + 7)$$

$$(-11y^2 \times 3y) + (-11y^2 \times 7)$$

$$-33y^3 - 77y^2$$

5. $\frac{6x}{5}(x^3 + y^3)$

Solution:

Let us simplify the given expression

$$\frac{6}{5}x(x^3 + y^3)$$

$$(\frac{6}{5}x \times x^3) + (\frac{6}{5}x \times y^3)$$

$$\frac{6}{5}x^4 + \frac{6}{5}xy^3$$

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6. $xy (x^3 - y^3)$

Solution:

Let us simplify the given expression

$$xy (x^3 - y^3)$$

$$(xy \times x^3) - (xy \times y^3)$$

$$x^4y - xy^4$$

7. $0.1y (0.1x^5 + 0.1y)$

Solution:

Let us simplify the given expression

$$0.1y (0.1x^5 + 0.1y)$$

$$(0.1y \times 0.1x^5) + (0.1y \times 0.1y)$$

$$0.01x^5y + 0.01y^2$$

8. $(-7/4ab^2c - 6/25a^2c^2) (-50a^2b^2c^2)$

Solution:

Let us simplify the given expression

$$(-7/4ab^2c - 6/25a^2c^2) (-50a^2b^2c^2)$$

$$(-7/4ab^2c \times -50a^2b^2c^2) - (6/25a^2c^2 \times -50a^2b^2 \times c^2)$$

$$350/4a^3b^4c^3 + 12a^4b^2c^4$$

$$175/2a^3b^4c^3 + 12a^4b^2c^4$$

9. $-8/27xyz (3/2xyz^2 - 9/4xy^2z^3)$

Solution:

Let us simplify the given expression

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$$-8/27xyz (3/2xyz^2 - 9/4xy^2z^3)$$

$$(-8/27xyz \times 3/2xyz^2) - (-8/27xyz \times 9/4xy^2z^3)$$

$$-4/9x^2y^2z^3 + 2/3x^2y^3z^4$$

10. $-4/27xyz (9/2x^2yz - 3/4xyz^2)$

Solution:

Let us simplify the given expression

$$-4/27xyz (9/2x^2yz - 3/4xyz^2)$$

$$(-4/27xyz \times 9/2x^2yz) - (-4/27xyz \times 3/4xyz^2)$$

$$-2/3x^3y^2z^2 + 1/9x^2y^2z^3$$

11. $1.5x (10x^2y - 100xy^2)$

Solution:

Let us simplify the given expression

$$1.5x (10x^2y - 100xy^2)$$

$$(1.5x \times 10x^2y) - (1.5x \times 100xy^2)$$

$$15x^3y - 150x^2y^2$$

12. $4.1xy (1.1x - y)$

Solution:

Let us simplify the given expression

$$4.1xy (1.1x - y)$$

$$(4.1xy \times 1.1x) - (4.1xy \times y)$$

$$4.51x^2y - 4.1xy^2$$

13. $250.5xy (xz + y/10)$

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Solution:

Let us simplify the given expression

$$250.5xy(xz + y/10)$$

$$(250.5xy \times xz) + (250.5xy \times y/10)$$

$$250.5x^2yz + 25.05xy^2$$

14. $\frac{7}{5}x^2y(3/5xy^2 + 2/5x)$

Solution:

Let us simplify the given expression

$$\frac{7}{5}x^2y(3/5xy^2 + 2/5x)$$

$$(\frac{7}{5}x^2y \times 3/5xy^2) + (\frac{7}{5}x^2y \times 2/5x)$$

$$21/25x^3y^3 + 14/25x^3y$$

15. $\frac{4}{3}a(a^2 + b^2 - 3c^2)$

Solution:

Let us simplify the given expression

$$\frac{4}{3}a(a^2 + b^2 - 3c^2)$$

$$(\frac{4}{3}a \times a^2) + (\frac{4}{3}a \times b^2) - (\frac{4}{3}a \times 3c^2)$$

$$\frac{4}{3}a^3 + \frac{4}{3}ab^2 - 4ac^2$$

16. Find the product $24x^2(1-2x)$ and evaluate its value for $x = 3$

Solution:

Let us simplify the given expression

$$24x^2(1 - 2x)$$

$$(24x^2 \times 1) - (24x^2 \times 2x)$$

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$$24x^2 - 48x^3$$

Now let us evaluate the expression when $x = 3$

$$24x^2 - 48x^3$$

$$24 \times (3)^2 - 48 \times (3)^3$$

$$24 \times (9) - 48 \times (27)$$

$$216 - 1296$$

$$-1080$$

17. Find the product $-3y(xy+y^2)$ and evaluate its value for $x = 4$ and $y = 5$

Solution:

Let us simplify the given expression

$$-3y(xy+y^2)$$

$$(-3y \times xy) + (-3y \times y^2)$$

$$-3xy^2 - 3y^3$$

Now let us evaluate the expression when $x = 4$ and $y = 5$

$$-3xy^2 - 3y^3$$

$$-3 \times (4) \times (5)^2 - 3 \times (5)^3$$

$$-300 - 375$$

$$-675$$

18. Multiply $-3/2x^2y^3$ by $(2x-y)$ and verify the answer for $x = 1$ and $y = 2$

Solution:

Let us simplify the given expression

$$-3/2x^2y^3 \text{ by } (2x-y)$$

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$$(-3/2x^2y^3 \times 2x) - (-3/2x^2y^3 \times y)$$

$$-3x^3y^3 + 3/2x^2y^4$$

Now let us evaluate the expression when $x = 1$ and $y = 2$

$$-3x^3y^3 + 3/2x^2y^4$$

$$-3 \times (1)^4 \times (2)^3 + 3/2 \times (1)^2 \times (2)^4$$

$$-3 \times (8) + 3(8)$$

$$-24+24$$

$$0$$

19. Multiply the monomial by the binomial and find the value of each for $x = -1$, $y = 0.25$ and $z = 0.005$:

(i) $15y^2(2 - 3x)$

(ii) $-3x(y^2 + z^2)$

(iii) $z^2(x - y)$

(iv) $xz(x^2 + y^2)$

Solution:

(i) $15y^2(2 - 3x)$

Let us simplify the given expression

$$30y^2 - 45xy^2$$

By evaluating the values in the expression $x = -1$, $y = 25/100$ and $z = 5/1000$

$$30 \times (25/100)^2 - 45 \times (-1) \times (25/100)^2$$

$$30(1/16) + 45(1/16)$$

$$15/8 + 45/16$$

$$(30+45)/16$$

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75/16

(ii) $-3x(y^2 + z^2)$

Let us simplify the given expression

$$-3xy^2 + -3xz^2$$

By evaluating the values in the expression $x = -1$, $y = 25/100$ and $z = 5/1000$

$$-3 \times (-1) \times (25/100)^2 - 3 \times (-1) \times (5/1000)^2$$

$$(3 \times 25 \times 25/100 \times 100) + (3 \times 5 \times 5/1000 \times 1000)$$

$$3/16 + 3/40000$$

$$39/200$$

(iii) $z^2(x - y)$

Let us simplify the given expression

$$z^2x - z^2y$$

By evaluating the values in the expression $x = -1$, $y = 25/100$ and $z = 5/1000$

$$z^2(x - y)$$

$$(5/1000)^2(-1 - 25/100)$$

$$(1/40000)(-100 - 25/100)$$

$$(1/40000)(-125/100)$$

$$(1/40000)(-5/4)$$

$$-5/160000$$

$$-1/32000$$

(iv) $xz(x^2 + y^2)$

Let us simplify the given expression

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$$x^3z + xzy^2$$

By evaluating the values in the expression $x = -1$, $y = 25/100$ and $z = 5/1000$

$$x^3z + xzy^2$$

$$(-1)^3 \times (5/1000) + (-1) \times (5/1000) \times (25/100)^2$$

$$-1/200 - 1/16 \times 1/200$$

$$-1/200 - 1/3200$$

By taking LCM as 3200

$$(-16 - 1)/3200$$

$$-17/3200$$

20. Simplify:

(i) $2x^2(x^3 - x) - 3x(x^4 + 2x) - 2(x^4 - 3x^2)$

(ii) $x^3y(x^2 - 2x) + 2xy(x^3 - x^4)$

(iii) $3a^2 + 2(a+2) - 3a(2a+1)$

(iv) $x(x+4) + 3x(2x^2 - 1) + 4x^2 + 4$

(v) $a(b-c) - b(c-a) - c(a-b)$

(vi) $a(b-c) + b(c-a) + c(a-b)$

(vii) $4ab(a-b) - 6a^2(b-b^2) - 3b^2(2a^2 - a) + 2ab(b-a)$

(viii) $x^2(x^2 + 1) - x^3(x + 1) - x(x^3 - x)$

(ix) $2a^2 + 3a(1 - 2a^3) + a(a + 1)$

(x) $a^2(2a - 1) + 3a + a^3 - 8$

(xi) $3/2x^2(x^2 - 1) + 1/4x^2(x^2 + x) - 3/4x(x^3 - 1)$

(xii) $a^2b(a-b^2) + ab^2(4ab - 2a^2) - a^3b(1-2b)$

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(xiii) $a^2b(a^3 - a + 1) - ab(a^4 - 2a^2 + 2a) - b(a^3 - a^2 - 1)$

Solution:

(i) $2x^2(x^3 - x) - 3x(x^4 + 2x) - 2(x^4 - 3x^2)$

Let us simplify the given expression

$$2x^5 - 2x^3 - 3x^5 - 6x^2 - 2x^4 + 6x^2$$

By grouping similar expressions we get,

$$2x^5 - 3x^5 - 2x^3 - 2x^4 - 6x^2 + 6x^2$$

$$-x^5 - 2x^4 - 2x^3$$

(ii) $x^3y(x^2 - 2x) + 2xy(x^3 - x^4)$

Let us simplify the given expression

$$x^5y - 2x^4y + 2x^4y - 2x^5y$$

By grouping similar expressions we get,

$$-x^5y - 2x^5y$$

$$-x^5y$$

(iii) $3a^2 + 2(a+2) - 3a(2a+1)$

Let us simplify the given expression

$$3a^2 + 2a + 4 - 6a^2 - 3a$$

By grouping similar expressions we get,

$$3a^2 - 6a^2 + 2a - 3a + 4$$

$$-3a^2 - a + 4$$

(iv) $x(x+4) + 3x(2x^2 - 1) + 4x^2 + 4$

Let us simplify the given expression

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$$x^2 + 4x + 6x^3 - 3x + 4x^2 + 4$$

By grouping similar expressions we get,

$$6x^3 + 5x^2 + x + 4$$

(v) $a(b-c) - b(c-a) - c(a-b)$

Let us simplify the given expression

$$ab - ac - bc + ab - ca + bc$$

By grouping similar expressions we get,

$$2ab - 2ac$$

(vi) $a(b-c) + b(c-a) + c(a-b)$

Let us simplify the given expression

$$ab - ac + bc - ab + ac - bc$$

By grouping similar expressions we get,

$$0$$

(vii) $4ab(a-b) - 6a^2(b-b^2) - 3b^2(2a^2 - a) + 2ab(b-a)$

Let us simplify the given expression

$$4a^2b - 4ab^2 - 6a^2b + 6a^2b^2 - 6a^2b^2 + 3ab^2 + 2ab^2 - 2a^2b$$

By grouping similar expressions we get,

$$4a^2b - 6a^2b - 2a^2b - 4ab^2 + 3ab^2 + 2ab^2 + 6a^2b^2 - 6a^2b^2$$

$$-4a^2b + ab^2$$

(viii) $x^2(x^2 + 1) - x^3(x + 1) - x(x^3 - x)$

Let us simplify the given expression

$$x^4 + x^2 - x^4 - x^3 - x^4 + x^2$$

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By grouping similar expressions we get,

$$x^4 - x^4 - x^4 - x^3 + x^2 + x^2$$
$$- x^4 - x^3 + 2x^2$$

(ix) $2a^2 + 3a(1 - 2a^3) + a(a + 1)$

Let us simplify the given expression

$$2a^2 + 3a - 6a^4 + a^2 + a$$

By grouping similar expressions we get,

$$-6a^4 + 3a^2 + 4a$$

(x) $a^2(2a - 1) + 3a + a^3 - 8$

Let us simplify the given expression

$$2a^3 - a^2 + 3a + a^3 - 8$$

By grouping similar expressions we get,

$$3a^3 - a^2 + 3a - 8$$

(xi) $3/2x^2(x^2 - 1) + 1/4x^2(x^2 + x) - 3/4x(x^3 - 1)$

Let us simplify the given expression

$$3/2x^4 - 3/2x^2 + 1/4x^4 + 1/4x^3 - 3/4x^4 + 3/4x$$

By grouping similar expressions we get,

$$3/2x^4 + 1/4x^4 - 3/4x^4 - 3/2x^2 + 1/4x^3 + 3/4x$$

$$4/4x^4 + 1/4x^3 - 3/2x^2 + 3/4x$$

$$x^4 + 1/4x^3 - 3/2x^2 + 3/4x$$

(xii) $a^2b(a - b^2) + ab^2(4ab - 2a^2) - a^3b(1 - 2b)$

Let us simplify the given expression

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$$a^3b - a^2b^3 + 4a^2b^3 - 2a^3b^2 - a^3b + 2a^3b^2$$

By grouping similar expressions we get,

$$-a^2b^3 + 4a^2b^3$$

$$3a^2b^3$$

$$\text{(xiii) } a^2b(a^3 - a + 1) - ab(a^4 - 2a^2 + 2a) - b(a^3 - a^2 - 1)$$

Let us simplify the given expression

$$a^5b - a^3b + a^2b - a^5b + 2a^3b - 2a^2b - ba^3 + a^2b + b$$

By grouping similar expressions we get,

$$a^5b - a^5b - a^3b + 2a^3b - ba^3 + a^2b - 2a^2b + a^2b + b$$

$$b$$

EXERCISE 6.5 PAGE NO: 6.30

Multiply:

1. $(5x + 3)$ by $(7x + 2)$

Solution:

Now let us simplify the given expression

$$(5x + 3) \times (7x + 2)$$

$$5x(7x + 2) + 3(7x + 2)$$

$$35x^2 + 10x + 21x + 6$$

$$35x^2 + 31x + 6$$

2. $(2x + 8)$ by $(x - 3)$

Solution:

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Now let us simplify the given expression

$$(2x + 8) \times (x - 3)$$

$$2x(x - 3) + 8(x - 3)$$

$$2x^2 - 6x + 8x - 24$$

$$2x^2 + 2x - 24$$

3. $(7x + y)$ by $(x + 5y)$

Solution:

Now let us simplify the given expression

$$(7x + y) \times (x + 5y)$$

$$7x(x + 5y) + y(x + 5y)$$

$$7x^2 + 35xy + xy + 5y^2$$

$$7x^2 + 36xy + 5y^2$$

4. $(a - 1)$ by $(0.1a^2 + 3)$

Solution:

Now let us simplify the given expression

$$(a - 1) \times (0.1a^2 + 3)$$

$$a(0.1a^2 + 3) - 1(0.1a^2 + 3)$$

$$0.1a^3 + 3a - 0.1a^2 - 3$$

$$0.1a^3 - 0.1a^2 + 3a - 3$$

5. $(3x^2 + y^2)$ by $(2x^2 + 3y^2)$

Solution:

Now let us simplify the given expression

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$$(3x^2 + y^2) \times (2x^2 + 3y^2)$$

$$3x^2 \times (2x^2 + 3y^2) + y^2 \times (2x^2 + 3y^2)$$

$$6x^4 + 9x^2y^2 + 2x^2y^2 + 3y^4$$

$$6x^4 + 11x^2y^2 + 3y^4$$

6. $(\frac{3}{5}x + \frac{1}{2}y)$ by $(\frac{5}{6}x + 4y)$

Solution:

Now let us simplify the given expression

$$(\frac{3}{5}x + \frac{1}{2}y) \times (\frac{5}{6}x + 4y)$$

$$\frac{3}{5}x \times (\frac{5}{6}x + 4y) + \frac{1}{2}y \times (\frac{5}{6}x + 4y)$$

$$\frac{15}{30}x^2 + \frac{12}{5}xy + \frac{5}{12}xy + \frac{4}{2}y^2$$

$$\frac{1}{2}x^2 + \frac{169}{60}xy + 2y^2$$

7. $(x^6 - y^6)$ by $(x^2 + y^2)$

Solution:

Now let us simplify the given expression

$$(x^6 - y^6) \times (x^2 + y^2)$$

$$x^6 \times (x^2 + y^2) - y^6 \times (x^2 + y^2)$$

$$x^8 + x^6y^2 - x^2y^6 - y^8$$

8. $(x^2 + y^2)$ by $(3a + 2b)$

Solution:

Now let us simplify the given expression

$$(x^2 + y^2) \times (3a + 2b)$$

$$x^2 \times (3a + 2b) + y^2 \times (3a + 2b)$$

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$$3ax^2 + 3ay^2 + 2bx^2 + 2by^2$$

9. $(-3d - 7f)$ by $(5d + f)$

Solution:

Now let us simplify the given expression

$$(-3d - 7f) \times (5d + f)$$

$$-3d(5d + f) - 7f(5d + f)$$

$$-15d^2 - 3df - 35df - 7f^2$$

$$-15d^2 - 38df - 7f^2$$

10. $(0.8a - 0.5b)$ by $(1.5a - 3b)$

Solution:

Now let us simplify the given expression

$$(0.8a - 0.5b) \times (1.5a - 3b)$$

$$0.8a(1.5a - 3b) - 0.5b(1.5a - 3b)$$

$$1.2a^2 - 2.4ab - 0.75ab + 1.5b^2$$

$$1.2a^2 - 3.15ab + 1.5b^2$$

11. $(2x^2y^2 - 5xy^2)$ by $(x^2 - y^2)$

Solution:

Now let us simplify the given expression

$$(2x^2y^2 - 5xy^2) \times (x^2 - y^2)$$

$$2x^2y^2(x^2 - y^2) - 5xy^2(x^2 - y^2)$$

$$2x^4y^2 - 5x^3y^2 - 2x^2y^4 + 5xy^4$$

12. $(x/7 + x^2/2)$ by $(2/5 + 9x/4)$

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Solution:

Now let us simplify the given expression

$$(x/7 + x^2/2) \times (2/5 + 9x/4)$$

$$x/7 (2/5 + 9x/4) + x^2/2 (2/5 + 9x/4)$$

$$2x/35 + (9x^2)/28 + x^2/5 + (9x^3)/8$$

$$9/8x^3 + 73/140x^2 + 2/35x$$

13. $(-a/7 + a^2/9)$ by $(b/2 - b^2/3)$ **Solution:**

Now let us simplify the given expression

$$(-a/7 + a^2/9) \times (b/2 - b^2/3)$$

$$-a/7 (b/2 - b^2/3) + a^2/9 (b/2 - b^2/3)$$

$$-ab/14 + ab^2/21 + a^2b/18 - a^2b^2/27$$

14. $(3x^2y - 5xy^2)$ by $(1/5x^2 + 1/3y^2)$ **Solution:**

Now let us simplify the given expression

$$(3x^2y - 5xy^2) \times (1/5x^2 + 1/3y^2)$$

$$3x^2y (1/5x^2 + 1/3y^2) - 5xy^2 (1/5x^2 + 1/3y^2)$$

$$3/5x^4y + 3/3x^2y^3 - x^3y^2 + 5/3xy^4$$

$$3/5x^4y + x^2y^3 - x^3y^2 + 5/3xy^4$$

15. $(2x^2 - 1)$ by $(4x^3 + 5x^2)$ **Solution:**

Now let us simplify the given expression

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$$(2x^2 - 1) \times (4x^3 + 5x^2)$$

$$2x^2 (4x^3 + 5x^2) - 1 (4x^3 + 5x^2)$$

$$8x^5 + 10x^4 - 4x^3 - 5x^2$$

16. $(2xy + 3y^2)$ by $(3y^2 - 2)$

Solution:

Now let us simplify the given expression

$$(2xy + 3y^2) \times (3y^2 - 2)$$

$$2xy (3y^2 - 2) + 3y^2 (3y^2 - 2)$$

$$6xy^3 - 4xy + 9y^4 - 6y^2$$

Find the following products and verify the results for $x = -1$, $y = -2$:

17. $(3x - 5y)(x + y)$

Solution:

Now let us simplify the given expression

$$(3x - 5y) \times (x + y)$$

$$(3x - 5y) \times (x + y)$$

$$x (3x - 5y) + y (3x - 5y)$$

$$3x^2 - 5xy + 3xy - 5y^2$$

$$3x^2 - 2xy - 5y^2$$

Let us substitute the given values $x = -1$ and $y = -2$, then

$$(3x - 5y) \times (x + y) [3(-1) - 5(-2)] \times [(-1) + (-2)]$$

$$(-3+10) \times (-1-2)$$

$$7 \times -3$$

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-21

$$3x^2 - 2xy - 5y^2$$

$$3(-1)^2 - 2(-1)(-2) - 5(-2)^2$$

$$3 - 4 - 20$$

-21

∴ the given expression is verified.

18. $(x^2y - 1)(3 - 2x^2y)$

Solution:

Now let us simplify the given expression

$$(x^2y - 1) \times (3 - 2x^2y)$$

$$x^2y(3 - 2x^2y) - 1(3 - 2x^2y)$$

$$3x^2y - 2x^4y^2 - 3 + 2x^2y$$

$$5x^2y - 2x^4y^2 - 3$$

Let us substitute the given values $x = -1$ and $y = -2$, then

$$(x^2y - 1) \times (3 - 2x^2y)[(-1)^2(-2) - 1] \times [3 - 2(-1)^2(-2)]$$

$$(-2 - 1) \times (3 + 4)$$

$$-3 \times 7$$

-21

$$5x^2y - 2x^4y^2 - 3[-2(-1)^4(-2)^2 + 5(-1)^2(2) - 3]$$

$$-8 - 10 - 3$$

-21

∴ the given expression is verified.

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19. $(\frac{1}{3}x - \frac{y^2}{5})(\frac{1}{3}x + \frac{y^2}{5})$

Solution:

Now let us simplify the given expression

$$(\frac{1}{3}x - \frac{y^2}{5}) \times (\frac{1}{3}x + \frac{y^2}{5})$$

$$(\frac{1}{3}x)^2 - (\frac{y^2}{5})^2$$

$$(\frac{1}{3}x - \frac{y^2}{5})(\frac{1}{3}x + \frac{y^2}{5})$$

$$\frac{1}{9}x^2 - \frac{1}{25}y^4$$

Let us substitute the given values $x = -1$ and $y = -2$, then

$$(\frac{1}{3}x - \frac{y^2}{5}) \times (\frac{1}{3}x + \frac{y^2}{5})$$

$$(\frac{1}{3}(-1) - \frac{(-2)^2}{5}) \times (\frac{1}{3}(-1) + \frac{(-2)^2}{5})$$

$$(-\frac{17}{15}) \times (\frac{7}{15})$$

$$-\frac{119}{225}$$

$$\frac{1}{9}x^2 - \frac{1}{25}y^4$$

$$\frac{1}{9}(-1)^2 - \frac{1}{25}(-2)^4$$

$$\frac{1}{9} - \frac{16}{25}$$

$$-\frac{119}{225}$$

\therefore the given expression is verified.

Simplify:

20. $x^2(x + 2y)(x - 3y)$

Solution:

Now let us simplify the given expression

$$x^2(x + 2y)(x - 3y)$$

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$$x^2 (x^2 - 3xy + 2xy - 3y^2)$$

$$x^2 (x^2 - xy - 6y^2)$$

$$x^4 - x^3y - 6x^2y^2$$

21. $(x^2 - 2y^2) (x + 4y)x^2y^2$

Solution:

Now let us simplify the given expression

$$(x^2 - 2y^2) (x + 4y)x^2y^2$$

$$(x^3 + 4x^2y - 2xy^2 - 8y^3) \times x^2y^2$$

$$x^5y^2 + 4x^4y^3 - 2x^3y^4 - 8x^2y^5$$

22. $a^2b^2 (a + 2b) (3a + b)$

Solution:

Now let us simplify the given expression

$$a^2b^2 (a + 2b) (3a + b)$$

$$a^2b^2 (3a^2 + ab + 6ab + 2b^2)$$

$$a^2b^2 (3a^2 + 7ab + 2b^2)$$

$$3a^4b^2 + 7a^3b^3 + 2a^2b^4$$

23. $x^2 (x - y) y^2 (x + 2y)$

Solution:

Now let us simplify the given expression

$$x^2 (x - y) y^2 (x + 2y)$$

$$x^2y^2 (x^2 + 2xy - xy - 2y^2)$$

$$x^2y^2 (x^2 + xy - 2y^2)$$

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$$x^4y^2 + x^3y^3 - 2x^2y^4$$

24. $(x^3 - 2x^2 + 5x - 7)(2x - 3)$

Solution:

Now let us simplify the given expression

$$(x^3 - 2x^2 + 5x - 7)(2x - 3)$$

$$2x^4 - 4x^3 + 10x^2 - 14x - 3x^3 + 6x^2 - 15x + 21$$

$$2x^4 - 7x^3 + 16x^2 - 29x + 21$$

25. $(5x + 3)(x - 1)(3x - 2)$

Solution:

Now let us simplify the given expression

$$(5x + 3)(x - 1)(3x - 2)$$

$$(5x^2 - 2x - 3)(3x - 2)$$

$$15x^3 - 6x^2 - 9x - 10x^2 + 4x + 6$$

$$15x^3 - 16x^2 - 5x + 6$$

26. $(5 - x)(6 - 5x)(2 - x)$

Solution:

Now let us simplify the given expression

$$(5 - x)(6 - 5x)(2 - x)$$

$$(x^2 - 7x + 10)(6 - 5x)$$

$$-5x^3 + 35x^2 - 50x + 6x^2 - 42x + 60$$

$$60 - 92x + 41x^2 - 5x^3$$

27. $(2x^2 + 3x - 5)(3x^2 - 5x + 4)$

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Solution:

Now let us simplify the given expression

$$(2x^2 + 3x - 5)(3x^2 - 5x + 4)$$

$$6x^4 + 9x^3 - 15x^2 - 10x^3 - 15x^2 + 25x + 8x^2 + 12x - 20$$

$$6x^4 - x^3 - 22x^2 + 37x - 20$$

28. $(3x - 2)(2x - 3) + (5x - 3)(x + 1)$

Solution:

Now let us simplify the given expression

$$(3x - 2)(2x - 3) + (5x - 3)(x + 1)$$

$$6x^2 - 9x - 4x + 6 + 5x^2 + 5x - 3x - 3$$

$$11x^2 - 11x + 3$$

29. $(5x - 3)(x + 2) - (2x + 5)(4x - 3)$

Solution:

Now let us simplify the given expression

$$(5x - 3)(x + 2) - (2x + 5)(4x - 3)$$

$$5x^2 + 10x - 3x - 6 - 8x^2 + 6x - 20x + 15$$

$$-3x^2 - 7x + 9$$

30. $(3x + 2y)(4x + 3y) - (2x - y)(7x - 3y)$

Solution:

Now let us simplify the given expression

$$(3x + 2y)(4x + 3y) - (2x - y)(7x - 3y)$$

$$12x^2 + 9xy + 8xy$$

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$$12x^2 + 9xy + 8xy + 6y^2 - 14x^2 + 6xy + 7xy - 3y^2$$

$$-2x^2 + 3y^2 + 30xy$$

31. $(x^2 - 3x + 2)(5x - 2) - (3x^2 + 4x - 5)(2x - 1)$

Solution:

Now let us simplify the given expression

$$(x^2 - 3x + 2)(5x - 2) - (3x^2 + 4x - 5)(2x - 1)$$

$$5x^3 - 15x^2 + 10x - 2x^2 + 6x - 4 - (6x^3 + 8x^2 - 10x - 3x^2 - 4x + 5)$$

$$5x^3 - 6x^3 - 15x^2 - 2x^2 - 5x^2 + 16x + 14x - 4 - 5$$

$$-x^3 - 22x^2 + 30x - 9$$

32. $(x^3 - 2x^2 + 3x - 4)(x - 1) - (2x - 3)(x^2 - x + 1)$

Solution:

Now let us simplify the given expression

$$(x^3 - 2x^2 + 3x - 4)(x - 1) - (2x - 3)(x^2 - x + 1)$$

$$x^4 - 2x^3 + 3x^2 - 4x - x^3 + 2x^2 - 3x + 4 - (2x^3 - 2x^2 + 2x - 3x^2 + 3x - 3)$$

$$x^4 - 3x^3 + 5x^2 - 7x + 4 - 2x^3 + 5x^2 - 5x + 3$$

$$x^4 - 5x^3 + 10x^2 - 12x + 7$$

EXERCISE 6.6 PAGE NO: 6.43

1. Write the following squares of binomials as trinomials:

(i) $(x + 2)^2$

(ii) $(8a + 3b)^2$

(iii) $(2m + 1)^2$

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(iv) $(9a + 1/6)^2$

(v) $(x + x^2/2)^2$

(vi) $(x/4 - y/3)^2$

(vii) $(3x - 1/3x)^2$

(viii) $(x/y - y/x)^2$

(ix) $(3a/2 - 5b/4)^2$

(x) $(a^2b - bc^2)^2$

(xi) $(2a/3b + 2b/3a)^2$

(xii) $(x^2 - ay)^2$

Solution:

(i) $(x + 2)^2$

Let us express the given expression in trinomial

$$x^2 + 2(x)(2) + 2^2$$

$$x^2 + 4x + 4$$

(ii) $(8a + 3b)^2$

Let us express the given expression in trinomial

$$(8a)^2 + 2(8a)(3b) + (3b)^2$$

$$64a^2 + 48ab + 9b^2$$

(iii) $(2m + 1)^2$

Let us express the given expression in trinomial

$$(2m)^2 + 2(2m)(1) + 1^2$$

$$4m^2 + 4m + 1$$

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(iv) $(9a + 1/6)^2$

Let us express the given expression in trinomial

$$(9a)^2 + 2 (9a) (1/6) + (1/6)^2$$

$$81a^2 + 3a + 1/36$$

(v) $(x + x^2/2)^2$

Let us express the given expression in trinomial

$$(x)^2 + 2 (x) (x^2/2) + (x^2/2)^2$$

$$x^2 + x^3 + 1/4x^4$$

(vi) $(x/4 - y/3)^2$

Let us express the given expression in trinomial

$$(x/4)^2 - 2 (x/4) (y/3) + (y/3)^2$$

$$1/16x^2 - xy/6 + 1/9y^2$$

(vii) $(3x - 1/3x)^2$

Let us express the given expression in trinomial

$$(3x)^2 - 2 (3x) (1/3x) + (1/3x)^2$$

$$9x^2 - 2 + 1/9x^2$$

(viii) $(x/y - y/x)^2$

Let us express the given expression in trinomial

$$(x/y)^2 - 2 (x/y) (y/x) + (y/x)^2$$

$$x^2/y^2 - 2 + y^2/x^2$$

(ix) $(3a/2 - 5b/4)^2$

Let us express the given expression in trinomial

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$$(3a/2)^2 - 2 (3a/2) (5b/4) + (5b/4)^2$$

$$9/4a^2 - 15/4ab + 25/16b^2$$

(x) $(a^2b - bc^2)^2$

Let us express the given expression in trinomial

$$(a^2b)^2 - 2 (a^2b) (bc^2) + (bc^2)^2$$

$$a^4b^2 - 2a^2b^2c^2 + b^2c^4$$

(xi) $(2a/3b + 2b/3a)^2$

Let us express the given expression in trinomial

$$(2a/3b)^2 + 2 (2a/3b) (2b/3a) + (2b/3a)^2$$

$$4a^2/9b^2 + 8/9 + 4b^2/9a^2$$

(xii) $(x^2 - ay)^2$

Let us express the given expression in trinomial

$$(x^2)^2 - 2 (x^2) (ay) + (ay)^2$$

$$x^4 - 2x^2ay + a^2y^2$$

2. Find the product of the following binomials:

(i) $(2x + y) (2x + y)$

(ii) $(a + 2b) (a - 2b)$

(iii) $(a^2 + bc) (a^2 - bc)$

(iv) $(4x/5 - 3y/4) (4x/5 + 3y/4)$

(v) $(2x + 3/y) (2x - 3/y)$

(vi) $(2a^3 + b^3) (2a^3 - b^3)$

(vii) $(x^4 + 2/x^2) (x^4 - 2/x^2)$

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(viii) $(x^3 + 1/x^3)(x^3 - 1/x^3)$

Solution:

(i) $(2x + y)(2x + y)$

Let us find the product of the given expression

$$2x(2x + y) + y(2x + y)$$

$$4x^2 + 2xy + 2xy + y^2$$

$$4x^2 + 4xy + y^2$$

(ii) $(a + 2b)(a - 2b)$

Let us find the product of the given expression

$$a(a - 2b) + 2b(a - 2b)$$

$$a^2 - 2ab + 2ab - 4b^2$$

$$a^2 - 4b^2$$

(iii) $(a^2 + bc)(a^2 - bc)$

Let us find the product of the given expression

$$a^2(a^2 - bc) + bc(a^2 - bc)$$

$$a^4 - a^2bc + bca^2 - b^2c^2$$

$$a^4 - b^2c^2$$

(iv) $(4x/5 - 3y/4)(4x/5 + 3y/4)$

Let us find the product of the given expression

$$4x/5(4x/5 + 3y/4) - 3y/4(4x/5 + 3y/4)$$

$$16/25x^2 + 12/20yx - 12/20xy - 9y^2/16$$

$$16/25x^2 - 9/16y^2$$

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(v) $(2x + 3/y)(2x - 3/y)$

Let us find the product of the given expression

$$2x(2x - 3/y) + 3/y(2x - 3/y)$$

$$4x^2 - 6x/y + 6x/y - 9/y^2$$

$$4x^2 - 9/y^2$$

(vi) $(2a^3 + b^3)(2a^3 - b^3)$

Let us find the product of the given expression

$$2a^3(2a^3 - b^3) + b^3(2a^3 - b^3)$$

$$4a^6 - 2a^3b^3 + 2a^3b^3 - b^6$$

$$4a^6 - b^6$$

(vii) $(x^4 + 2/x^2)(x^4 - 2/x^2)$

Let us find the product of the given expression

$$x^4(x^4 - 2/x^2) + 2/x^2(x^4 - 2/x^2)$$

$$x^8 - 2x^2 + 2x^2 - 4/x^4$$

$$(x^8 - 4/x^4)$$

(viii) $(x^3 + 1/x^3)(x^3 - 1/x^3)$

Let us find the product of the given expression

$$x^3(x^3 - 1/x^3) + 1/x^3(x^3 - 1/x^3)$$

$$x^6 - 1 + 1 - 1/x^6$$

$$x^6 - 1/x^6$$

3. Using the formula for squaring a binomial, evaluate the following:

(i) $(102)^2$

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(ii) $(99)^2$

(iii) $(1001)^2$

(iv) $(999)^2$

(v) $(703)^2$

Solution:

(i) $(102)^2$

We can express 102 as $100 + 2$

So, $(102)^2 = (100 + 2)^2$

Upon simplification we get,

$$(100 + 2)^2 = (100)^2 + 2(100)(2) + 2^2$$

$$= 10000 + 400 + 4$$

$$= 10404$$

(ii) $(99)^2$

We can express 99 as $100 - 1$

So, $(99)^2 = (100 - 1)^2$

Upon simplification we get,

$$(100 - 1)^2 = (100)^2 - 2(100)(1) + 1^2$$

$$= 10000 - 200 + 1$$

$$= 9801$$

(iii) $(1001)^2$

We can express 1001 as $1000 + 1$

So, $(1001)^2 = (1000 + 1)^2$

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Upon simplification we get,

$$\begin{aligned}(1000 + 1)^2 &= (1000)^2 + 2 (1000) (1) + 1^2 \\ &= 1000000 + 2000 + 1 \\ &= 1002001\end{aligned}$$

(iv) $(999)^2$

We can express 999 as $1000 - 1$

$$\text{So, } (999)^2 = (1000 - 1)^2$$

Upon simplification we get,

$$\begin{aligned}(1000 - 1)^2 &= (1000)^2 - 2 (1000) (1) + 1^2 \\ &= 1000000 - 2000 + 1 \\ &= 998001\end{aligned}$$

(v) $(703)^2$

We can express 700 as $700 + 3$

$$\text{So, } (703)^2 = (700 + 3)^2$$

Upon simplification we get,

$$\begin{aligned}(700 + 3)^2 &= (700)^2 + 2 (700) (3) + 3^2 \\ &= 490000 + 4200 + 9 \\ &= 494209\end{aligned}$$

4. Simplify the following using the formula: $(a - b) (a + b) = a^2 - b^2$:

(i) $(82)^2 - (18)^2$

(ii) $(467)^2 - (33)^2$

(iii) $(79)^2 - (69)^2$

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(iv) 197×203

(v) 113×87

(vi) 95×105

(vii) 1.8×2.2

(viii) 9.8×10.2

Solution:

(i) $(82)^2 - (18)^2$

Let us simplify the given expression using the formula $(a - b)(a + b) = a^2 - b^2$

We get,

$$(82)^2 - (18)^2 = (82 - 18)(82 + 18)$$

$$= 64 \times 100$$

$$= 6400$$

(ii) $(467)^2 - (33)^2$

Let us simplify the given expression using the formula $(a - b)(a + b) = a^2 - b^2$

We get,

$$(467)^2 - (33)^2 = (467 - 33)(467 + 33)$$

$$= (434)(500)$$

$$= 217000$$

(iii) $(79)^2 - (69)^2$

Let us simplify the given expression using the formula $(a - b)(a + b) = a^2 - b^2$

We get,

$$(79)^2 - (69)^2 = (79 + 69)(79 - 69)$$

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$$= (148) (10)$$

$$= 1480$$

(iv) 197×203

We can express 203 as $200 + 3$ and 197 as $200 - 3$

Let us simplify the given expression using the formula $(a - b) (a + b) = a^2 - b^2$

We get,

$$197 \times 203 = (200 - 3) (200 + 3)$$

$$= (200)^2 - (3)^2$$

$$= 40000 - 9$$

$$= 39991$$

(v) 113×87

We can express 113 as $100 + 13$ and 87 as $100 - 13$

Let us simplify the given expression using the formula $(a - b) (a + b) = a^2 - b^2$

We get,

$$113 \times 87 = (100 - 13) (100 + 13)$$

$$= (100)^2 - (13)^2$$

$$= 10000 - 169$$

$$= 9831$$

(vi) 95×105

We can express 95 as $100 - 5$ and 105 as $100 + 5$

Let us simplify the given expression using the formula $(a - b) (a + b) = a^2 - b^2$

We get,

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$$95 \times 105 = (100 - 5)(100 + 5)$$

$$= (100)^2 - (5)^2$$

$$= 10000 - 25$$

$$= 9975$$

(vii) 1.8×2.2

We can express 1.8 as $2 - 0.2$ and 2.2 as $2 + 0.2$

Let us simplify the given expression using the formula $(a - b)(a + b) = a^2 - b^2$

We get,

$$1.8 \times 2.2 = (2 - 0.2)(2 + 0.2)$$

$$= (2)^2 - (0.2)^2$$

$$= 4 - 0.04$$

$$= 3.96$$

(viii) 9.8×10.2

We can express 9.8 as $10 - 0.2$ and 10.2 as $10 + 0.2$

Let us simplify the given expression using the formula $(a - b)(a + b) = a^2 - b^2$

We get,

$$9.8 \times 10.2 = (10 - 0.2)(10 + 0.2)$$

$$= (10)^2 - (0.2)^2$$

$$= 100 - 0.04$$

$$= 99.96$$

5. Simplify the following using the identities:

(i) $((58)^2 - (42)^2)/16$

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(ii) $178 \times 178 - 22 \times 22$

(iii) $(198 \times 198 - 102 \times 102)/96$

(iv) $1.73 \times 1.73 - 0.27 \times 0.27$

(v) $(8.63 \times 8.63 - 1.37 \times 1.37)/0.726$

Solution:

(i) $((58)^2 - (42)^2)/16$

Let us simplify the given expression using the formula $(a - b)(a + b) = a^2 - b^2$

We get,

$$((58)^2 - (42)^2)/16 = ((58-42)(58+42))/16$$

$$= ((16)(100))/16$$

$$= 100$$

(ii) $178 \times 178 - 22 \times 22$

Let us simplify the given expression using the formula $(a - b)(a + b) = a^2 - b^2$

We get,

$$178 \times 178 - 22 \times 22 = (178)^2 - (22)^2$$

$$= (178-22)(178+22)$$

$$= 200 \times 156$$

$$= 31200$$

(iii) $(198 \times 198 - 102 \times 102)/96$

Let us simplify the given expression using the formula $(a - b)(a + b) = a^2 - b^2$

We get,

$$(198 \times 198 - 102 \times 102)/96 = ((198)^2 - (102)^2)/96$$

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$$= ((198-102) (198+102))/96$$

$$= (96 \times 300)/96$$

$$= 300$$

(iv) $1.73 \times 1.73 - 0.27 \times 0.27$

Let us simplify the given expression using the formula $(a - b) (a + b) = a^2 - b^2$

We get,

$$1.73 \times 1.73 - 0.27 \times 0.27 = (1.73)^2 - (0.27)^2$$

$$= (1.73-0.27) (1.73+0.27)$$

$$= 1.46 \times 2$$

$$= 2.92$$

(v) $(8.63 \times 8.63 - 1.37 \times 1.37)/0.726$

Let us simplify the given expression using the formula $(a - b) (a + b) = a^2 - b^2$

We get,

$$(8.63 \times 8.63 - 1.37 \times 1.37)/0.726 = ((8.63)^2 - (1.37)^2)/0.726$$

$$= ((8.63-1.37) (8.63+1.37))/0.726$$

$$= (7.26 \times 10)/0.726$$

$$= 72.6/0.726$$

$$= 100$$

6. Find the value of x, if:

(i) $4x = (52)^2 - (48)^2$

(ii) $14x = (47)^2 - (33)^2$

(iii) $5x = (50)^2 - (40)^2$

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Solution:

(i) $4x = (52)^2 - (48)^2$

Let us simplify to find the value of x by using the formula $(a - b)(a + b) = a^2 - b^2$

$$4x = (52)^2 - (48)^2$$

$$4x = (52 - 48)(52 + 48)$$

$$4x = 4 \times 100$$

$$4x = 400$$

$$x = 100$$

(ii) $14x = (47)^2 - (33)^2$

Let us simplify to find the value of x by using the formula $(a - b)(a + b) = a^2 - b^2$

$$14x = (47)^2 - (33)^2$$

$$14x = (47 - 33)(47 + 33)$$

$$14x = 14 \times 80$$

$$x = 80$$

(iii) $5x = (50)^2 - (40)^2$

Let us simplify to find the value of x by using the formula $(a - b)(a + b) = a^2 - b^2$

$$5x = (50)^2 - (40)^2$$

$$5x = (50 - 40)(50 + 40)$$

$$5x = 10 \times 90$$

$$5x = 900$$

$$x = 180$$

7. If $x + 1/x = 20$, find the value of $x^2 + 1/x^2$.

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Solution:

We know that $x + 1/x = 20$

So when squaring both sides, we get

$$(x + 1/x)^2 = (20)^2$$

$$x^2 + 2 \times x \times 1/x + (1/x)^2 = 400$$

$$x^2 + 2 + 1/x^2 = 400$$

$$x^2 + 1/x^2 = 398$$

8. If $x - 1/x = 3$, find the values of $x^2 + 1/x^2$ and $x^4 + 1/x^4$.

Solution:

We know that $x - 1/x = 3$

So when squaring both sides, we get

$$(x - 1/x)^2 = (3)^2$$

$$x^2 - 2 \times x \times 1/x + (1/x)^2 = 9$$

$$x^2 - 2 + 1/x^2 = 9$$

$$x^2 + 1/x^2 = 9+2$$

$$x^2 + 1/x^2 = 11$$

Now again when we square on both sides we get,

$$(x^2 + 1/x^2)^2 = (11)^2$$

$$x^4 + 2 \times x^2 \times 1/x^2 + (1/x^2)^2 = 121$$

$$x^4 + 2 + 1/x^4 = 121$$

$$x^4 + 1/x^4 = 121-2$$

$$x^4 + 1/x^4 = 119$$

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$$\therefore x^2 + 1/x^2 = 11$$

$$x^4 + 1/x^4 = 119$$

9. If $x^2 + 1/x^2 = 18$, find the values of $x + 1/x$ and $x - 1/x$.

Solution:

We know that $x^2 + 1/x^2 = 18$

When adding 2 on both sides, we get

$$x^2 + 1/x^2 + 2 = 18 + 2$$

$$x^2 + 1/x^2 + 2 \times x \times 1/x = 20$$

$$(x + 1/x)^2 = 20$$

$$x + 1/x = \sqrt{20}$$

When subtracting 2 from both sides, we get

$$x^2 + 1/x^2 - 2 \times x \times 1/x = 18 - 2$$

$$(x - 1/x)^2 = 16$$

$$x - 1/x = \sqrt{16}$$

$$x - 1/x = 4$$

10. If $x + y = 4$ and $xy = 2$, find the value of $x^2 + y^2$

Solution:

We know that $x + y = 4$ and $xy = 2$

Upon squaring on both sides of the given expression, we get

$$(x + y)^2 = 4^2$$

$$x^2 + y^2 + 2xy = 16$$

$$x^2 + y^2 + 2(2) = 16 \quad (\text{since } xy=2)$$

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$$x^2 + y^2 + 4 = 16$$

$$x^2 + y^2 = 16 - 4$$

$$x^2 + y^2 = 12$$

11. If $x - y = 7$ and $xy = 9$, find the value of $x^2 + y^2$

Solution:

We know that $x - y = 7$ and $xy = 9$

Upon squaring on both sides of the given expression, we get

$$(x - y)^2 = 7^2$$

$$x^2 + y^2 - 2xy = 49$$

$$x^2 + y^2 - 2(9) = 49 \quad (\text{since } xy=9)$$

$$x^2 + y^2 - 18 = 49$$

$$x^2 + y^2 = 49 + 18$$

$$x^2 + y^2 = 67$$

12. If $3x + 5y = 11$ and $xy = 2$, find the value of $9x^2 + 25y^2$

Solution:

We know that $3x + 5y = 11$ and $xy = 2$

Upon squaring on both sides of the given expression, we get

$$(3x + 5y)^2 = 11^2$$

$$(3x)^2 + (5y)^2 + 2(3x)(5y) = 121$$

$$9x^2 + 25y^2 + 2(15xy) = 121 \quad (\text{since } xy=2)$$

$$9x^2 + 25y^2 + 2(15(2)) = 121$$

$$9x^2 + 25y^2 + 60 = 121$$

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$$9x^2 + 25y^2 = 121-60$$

$$9x^2 + 25y^2 = 61$$

13. Find the values of the following expressions:

(i) $16x^2 + 24x + 9$ when $x = 7/4$

(ii) $64x^2 + 81y^2 + 144xy$ when $x = 11$ and $y = 4/3$

(iii) $81x^2 + 16y^2 - 72xy$ when $x = 2/3$ and $y = 3/4$

Solution:

(i) $16x^2 + 24x + 9$ when $x = 7/4$

Let us find the values using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

$$(4x)^2 + 2 (4x) (3) + 3^2$$

$$(4x + 3)^2$$

Evaluating when $x = 7/4$ $[4 (7/4) + 3]^2$

$$(7 + 3)^2$$

$$100$$

(ii) $64x^2 + 81y^2 + 144xy$ when $x = 11$ and $y = 4/3$

Let us find the values using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

$$(8x)^2 + 2 (8x) (9y) + (9y)^2 (8x + 9y)$$

Evaluating when $x = 11$ and $y = 4/3$ $[8 (11) + 9 (4/3)]^2$

$$(88 + 12)^2$$

$$(100)^2$$

$$10000$$

(iii) $81x^2 + 16y^2 - 72xy$ when $x = 2/3$ and $y = 3/4$

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Let us find the values using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

$$(9x)^2 + (4y)^2 - 2(9x)(4y)$$

$$(9x - 4y)^2$$

Putting $x = 2/3$ and $y = 3/4$ $[9(2/3) - 4(3/4)]^2$

$$(6 - 3)^2$$

$$3^2$$

$$9$$

14. If $x + 1/x = 9$ find the value of $x^4 + 1/x^4$.

Solution:

We know that $x + 1/x = 9$

So when squaring both sides, we get

$$(x + 1/x)^2 = (9)^2$$

$$x^2 + 2 \times x \times 1/x + (1/x)^2 = 81$$

$$x^2 + 2 + 1/x^2 = 81$$

$$x^2 + 1/x^2 = 81 - 2$$

$$x^2 + 1/x^2 = 79$$

Now again when we square on both sides we get,

$$(x^2 + 1/x^2)^2 = (79)^2$$

$$x^4 + 2 \times x^2 \times 1/x^2 + (1/x^2)^2 = 6241$$

$$x^4 + 2 + 1/x^4 = 6241$$

$$x^4 + 1/x^4 = 6241 - 2$$

$$x^4 + 1/x^4 = 6239$$

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$$\therefore x^4 - 1/x^4 = 6239$$

15. If $x + 1/x = 12$ find the value of $x - 1/x$.

Solution:

We know that $x + 1/x = 12$

So when squaring both sides, we get

$$(x + 1/x)^2 = (12)^2$$

$$x^2 + 2 \times x \times 1/x + (1/x)^2 = 144$$

$$x^2 + 2 + 1/x^2 = 144$$

$$x^2 + 1/x^2 = 144 - 2$$

$$x^2 + 1/x^2 = 142$$

When subtracting 2 from both sides, we get

$$x^2 + 1/x^2 - 2 \times x \times 1/x = 142 - 2$$

$$(x - 1/x)^2 = 140$$

$$x - 1/x = \sqrt{140}$$

16. If $2x + 3y = 14$ and $2x - 3y = 2$, find value of xy . [Hint: Use $(2x+3y)^2 - (2x-3y)^2 = 24xy$]

Solution:

We know that the given equations are

$$2x + 3y = 14 \dots \text{equation (1)}$$

$$2x - 3y = 2 \dots \text{equation (2)}$$

Now, let us square both the equations and subtract equation (2) from equation (1), we get,

$$(2x + 3y)^2 - (2x - 3y)^2 = (14)^2 - (2)^2$$

$$4x^2 + 9y^2 + 12xy - 4x^2 - 9y^2 + 12xy = 196 - 4$$

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$$24 xy = 192$$

$$xy = 8$$

∴ the value of xy is 8.

17. If $x^2 + y^2 = 29$ and $xy = 2$, find the value of

(i) $x + y$

(ii) $x - y$

(iii) $x^4 + y^4$

Solution:

(i) $x + y$

We know that

$$x^2 + y^2 = 29$$

$$x^2 + y^2 + 2xy - 2xy = 29$$

$$(x + y)^2 - 2(2) = 29$$

$$(x + y)^2 = 29 + 4$$

$$x + y = \pm \sqrt{33}$$

(ii) $x - y$

We know that

$$x^2 + y^2 = 29$$

$$x^2 + y^2 + 2xy - 2xy = 29$$

$$(x - y)^2 + 2(2) = 29$$

$$(x - y)^2 + 4 = 29$$

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$$(x - y)^2 = 25$$

$$(x - y) = \pm 5$$

(iii) $x^4 + y^4$

We know that

$$x^2 + y^2 = 29$$

Squaring both sides, we get

$$(x^2 + y^2)^2 = (29)^2$$

$$x^4 + y^4 + 2x^2y^2 = 841$$

$$x^4 + y^4 + 2(2)^2 = 841$$

$$x^4 + y^4 = 841 - 8$$

$$x^4 + y^4 = 833$$

18. What must be added each of the following expression to make it a whole square?

(i) $4x^2 - 12x + 7$

(ii) $4x^2 - 20x + 20$

Solution:

(i) $4x^2 - 12x + 7$

$$(2x)^2 - 2(2x)(3) + 3^2 - 3^2 + 7$$

$$(2x - 3)^2 - 9 + 7$$

$$(2x - 3)^2 - 2$$

\therefore 2 must be added to the expression to make it a whole square.

(ii) $4x^2 - 20x + 20$

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$$(2x)^2 - 2(2x)(5) + 5^2 - 5^2 + 20$$

$$(2x - 5)^2 - 25 + 20$$

$$(2x - 5)^2 - 5$$

∴ 5 must be added to the expression to make it a whole square.

19. Simplify:

(i) $(x - y)(x + y)(x^2 + y^2)(x^4 + y^4)$

(ii) $(2x - 1)(2x + 1)(4x^2 + 1)(16x^4 + 1)$

(iii) $(7m - 8n)^2 + (7m + 8n)^2$

(iv) $(2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$

(v) $(m^2 - n^2m)^2 + 2m^3n^2$

Solution:

(i) $(x - y)(x + y)(x^2 + y^2)(x^4 + y^4)$

B7 grouping the values

$$(x^2 - y^2)(x^2 + y^2)(x^4 + y^4)[(x^2)^2 - (y^2)^2](x^4 + y^4)$$

$$(x^4 - y^4)(x^4 + y^4)[(x^4)^2 - (y^4)^2]$$

$$x^8 - y^8$$

(ii) $(2x - 1)(2x + 1)(4x^2 + 1)(16x^4 + 1)$

Let us simplify the expression by grouping $[(2x)^2 - (1)^2](4x^2 + 1)(16x^4 + 1)$

$$(4x^2 - 1)(4x^2 + 1)(16x^4 + 1)1[(4x^2)^2 - (1)^2](16x^4 + 1)1$$

$$(16x^4 - 1)(16x^4 + 1)1[(16x^4)^2 - (1)^2]1$$

$$256x^8 - 1$$

(iii) $(7m - 8n)^2 + (7m + 8n)^2$

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Upon expansion

$$(7m)^2 + (8n)^2 - 2(7m)(8n) + (7m)^2 + (8n)^2 + 2(7m)(8n)$$

$$(7m)^2 + (8n)^2 - 112mn + (7m)^2 + (8n)^2 + 112mn$$

$$49m^2 + 64n^2 + 49m^2 + 64n^2$$

By grouping the similar expression we get,

$$98m^2 + 64n^2 + 64n^2$$

$$98m^2 + 128n^2$$

$$\text{(iv) } (2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$$

Upon expansion

$$(2.5p)^2 + (1.5q)^2 - 2(2.5p)(1.5q) - (1.5p)^2 - (2.5q)^2 + 2(1.5p)(2.5q)$$

$$6.25p^2 + 2.25q^2 - 2.25p^2 - 6.25q^2$$

By grouping the similar expression we get,

$$4p^2 - 6.25q^2 + 2.25q^2$$

$$4p^2 - 4q^2$$

$$4(p^2 - q^2)$$

$$\text{(v) } (m^2 - n^2m)^2 + 2m^3n^2$$

Upon expansion using $(a + b)^2$ formula

$$(m^2)^2 - 2(m^2)(n^2)(m) + (n^2m)^2 + 2m^3n^2$$

$$m^4 - 2m^3n^2 + (n^2m)^2 + 2m^3n^2$$

$$m^4 + n^4m^2 - 2m^3n^2 + 2m^3n^2$$

$$m^4 + m^2n^4$$

20. Show that:

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$$(i) (3x + 7)^2 - 84x = (3x - 7)^2$$

$$(ii) (9a - 5b)^2 + 180ab = (9a + 5b)^2$$

$$(iii) (4m/3 - 3n/4)^2 + 2mn = 16m^2/9 + 9n^2/16$$

$$(iv) (4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$$

$$(v) (a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) = 0$$

Solution:

$$(i) (3x + 7)^2 - 84x = (3x - 7)^2$$

Let us consider LHS $(3x + 7)^2 - 84x$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

$$(3x)^2 + (7)^2 + 2(3x)(7) - 84x$$

$$(3x)^2 + (7)^2 + 42x - 84x$$

$$(3x)^2 + (7)^2 - 42x$$

$$(3x)^2 + (7)^2 - 2(3x)(7)$$

$$(3x - 7)^2 = \text{R.H.S}$$

Hence, proved

$$(ii) (9a - 5b)^2 + 180ab = (9a + 5b)^2$$

Let us consider LHS $(9a - 5b)^2 + 180ab$

By using the formula $(a + b)^2 = a^2 + b^2 + 2ab$

$$(9a)^2 + (5b)^2 - 2(9a)(5b) + 180ab$$

$$(9a)^2 + (5b)^2 - 90ab + 180ab$$

$$(9a)^2 + (5b)^2 + 90ab$$

$$(9a)^2 + (5b)^2 + 2(9a)(5b)$$

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$$(9a + 5b)^2 = \text{R.H.S}$$

Hence, proved

$$\text{(iii)} \quad (4m/3 - 3n/4)^2 + 2mn = 16m^2/9 + 9n^2/16$$

Let us consider LHS $(4m/3 - 3n/4)^2 + 2mn$

$$(4m/3)^2 + (3n/4)^2 - 2mn + 2mn$$

$$(4m/3)^2 + (3n/4)^2$$

$$16/9m^2 + 9/16n^2 = \text{R.H.S}$$

Hence, proved

$$\text{(iv)} \quad (4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$$

Let us consider LHS $(4pq + 3q)^2 - (4pq - 3q)^2$

$$(4pq)^2 + (3q)^2 + 2(4pq)(3q) - (4pq)^2 - (3q)^2 + 2(4pq)(3q)$$

$$24pq^2 + 24pq^2$$

$$48pq^2 = \text{RHS}$$

Hence, proved

$$\text{(v)} \quad (a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) = 0$$

Let us consider LHS $(a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a)$

By using the identity $(a - b)(a + b) = a^2 - b^2$

We get,

$$(a^2 - b^2) + (b^2 - c^2) + (c^2 - a^2)$$

$$a^2 - b^2 + b^2 - c^2 + c^2 - a^2$$

$$0 = \text{R.H.S}$$

Hence, proved

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EXERCISE 6.7 PAGE NO: 6.47

1. Find the following products:

(i) $(x + 4)(x + 7)$

(ii) $(x - 11)(x + 4)$

(iii) $(x + 7)(x - 5)$

(iv) $(x - 3)(x - 2)$

(v) $(y^2 - 4)(y^2 - 3)$

(vi) $(x + 4/3)(x + 3/4)$

(vii) $(3x + 5)(3x + 11)$

(viii) $(2x^2 - 3)(2x^2 + 5)$

(ix) $(z^2 + 2)(z^2 - 3)$

(x) $(3x - 4y)(2x - 4y)$

(xi) $(3x^2 - 4xy)(3x^2 - 3xy)$

(xii) $(x + 1/5)(x + 5)$

(xiii) $(z + 3/4)(z + 4/3)$

(xiv) $(x^2 + 4)(x^2 + 9)$

(xv) $(y^2 + 12)(y^2 + 6)$

(xvi) $(y^2 + 5/7)(y^2 - 14/5)$

(xvii) $(p^2 + 16)(p^2 - 1/4)$

Solution:

(i) $(x + 4)(x + 7)$

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Let us simplify the given expression

$$x(x + 7) + 4(x + 7)$$

$$x^2 + 7x + 4x + 28$$

$$x^2 + 11x + 28$$

(ii) $(x - 11)(x + 4)$

Let us simplify the given expression

$$x(x + 4) - 11(x + 4)$$

$$x^2 + 4x - 11x - 44$$

$$x^2 - 7x - 44$$

(iii) $(x + 7)(x - 5)$

Let us simplify the given expression

$$x(x - 5) + 7(x - 5)$$

$$x^2 - 5x + 7x - 35$$

$$x^2 + 2x - 35$$

(iv) $(x - 3)(x - 2)$

Let us simplify the given expression

$$x(x - 2) - 3(x - 2)$$

$$x^2 - 2x - 3x + 6$$

$$x^2 - 5x + 6$$

(v) $(y^2 - 4)(y^2 - 3)$

Let us simplify the given expression

$$y^2(y^2 - 3) - 4(y^2 - 3)$$

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$$y^4 - 3y^2 - 4y^2 + 12$$

$$y^4 - 7y^2 + 12$$

(vi) $(x + 4/3)(x + 3/4)$

Let us simplify the given expression

$$x(x + 3/4) + 4/3(x + 3/4)$$

$$x^2 + 3x/4 + 4x/3 + 12/12$$

$$x^2 + 3x/4 + 4x/3 + 1$$

$$x^2 + 25x/12 + 1$$

(vii) $(3x + 5)(3x + 11)$

Let us simplify the given expression

$$3x(3x + 11) + 5(3x + 11)$$

$$9x^2 + 33x + 15x + 55$$

$$9x^2 + 48x + 55$$

(viii) $(2x^2 - 3)(2x^2 + 5)$

Let us simplify the given expression

$$2x^2(2x^2 + 5) - 3(2x^2 + 5)$$

$$4x^4 + 10x^2 - 6x^2 - 15$$

$$4x^4 + 4x^2 - 15$$

(ix) $(z^2 + 2)(z^2 - 3)$

Let us simplify the given expression

$$z^2(z^2 - 3) + 2(z^2 - 3)$$

$$z^4 - 3z^2 + 2z^2 - 6$$

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$$z^4 - z^2 - 6$$

(x) $(3x - 4y)(2x - 4y)$

Let us simplify the given expression

$$3x(2x - 4y) - 4y(2x - 4y)$$

$$6x^2 - 12xy - 8xy + 16y^2$$

$$6x^2 - 20xy + 16y^2$$

(xi) $(3x^2 - 4xy)(3x^2 - 3xy)$

Let us simplify the given expression

$$3x^2(3x^2 - 3xy) - 4xy(3x^2 - 3xy)$$

$$9x^4 - 9x^3y - 12x^3y + 12x^2y^2$$

$$9x^4 - 21x^3y + 12x^2y^2$$

(xii) $(x + 1/5)(x + 5)$

Let us simplify the given expression

$$x(x + 1/5) + 5(x + 1/5)$$

$$x^2 + x/5 + 5x + 1$$

$$x^2 + 26/5x + 1$$

(xiii) $(z + 3/4)(z + 4/3)$

Let us simplify the given expression

$$z(z + 4/3) + 3/4(z + 4/3)$$

$$z^2 + 4/3z + 3/4z + 12/12$$

$$z^2 + 4/3z + 3/4z + 1$$

$$z^2 + 25/12z + 1$$

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(xiv) $(x^2 + 4)(x^2 + 9)$

Let us simplify the given expression

$$x^2(x^2 + 9) + 4(x^2 + 9)$$

$$x^4 + 9x^2 + 4x^2 + 36$$

$$x^4 + 13x^2 + 36$$

(xv) $(y^2 + 12)(y^2 + 6)$

Let us simplify the given expression

$$y^2(y^2 + 6) + 12(y^2 + 6)$$

$$y^4 + 6y^2 + 12y^2 + 72$$

$$y^4 + 18y^2 + 72$$

(xvi) $(y^2 + 5/7)(y^2 - 14/5)$

Let us simplify the given expression

$$y^2(y^2 - 14/5) + 5/7(y^2 - 14/5)$$

$$y^4 - 14/5y^2 + 5/7y^2 - 2$$

$$y^4 - 73/35y^2 - 2$$

(xvii) $(p^2 + 16)(p^2 - 1/4)$

Let us simplify the given expression

$$p^2(p^2 - 1/4) + 16(p^2 - 1/4)$$

$$p^4 - 1/4p^2 + 16p^2 - 4$$

$$p^4 + 63/4p^2 - 4$$

2. Evaluate the following:

(i) 102×106

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(ii) 109×107

(iii) 35×37

(iv) 53×55

(v) 103×96

(vi) 34×36

(vii) 994×1006

Solution:

(i) 102×106

We can express 102 as $100 + 2$ and 106 as $100 + 6$

Now let us simplify

$$102 \times 106 = (100 + 2)(100 + 6)$$

$$= 100(100 + 6) + 2(100 + 6)$$

$$= 10000 + 600 + 200 + 12$$

$$= 10812$$

(ii) 109×107

We can express 109 as $100 + 9$ and 107 as $100 + 7$

Now let us simplify

$$109 \times 107 = (100 + 9)(100 + 7)$$

$$= 100(100 + 7) + 9(100 + 7)$$

$$= 10000 + 700 + 900 + 63$$

$$= 11663$$

(iii) 35×37

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We can express 35 as $30 + 5$ and 37 as $30 + 7$

Now let us simplify

$$\begin{aligned}35 \times 37 &= (30 + 5)(30 + 7) \\ &= 30(30 + 7) + 5(30 + 7) \\ &= 900 + 210 + 150 + 35 \\ &= 1295\end{aligned}$$

(iv) 53×55

We can express 53 as $50 + 3$ and 55 as $50 + 5$

Now let us simplify

$$\begin{aligned}53 \times 55 &= (50 + 3)(50 + 5) \\ &= 50(50 + 5) + 3(50 + 5) \\ &= 2500 + 250 + 150 + 15 \\ &= 2915\end{aligned}$$

(v) 103×96

We can express 103 as $100 + 3$ and 96 as $100 - 4$

Now let us simplify

$$\begin{aligned}103 \times 96 &= (100 + 3)(100 - 4) \\ &= 100(100 - 4) + 3(100 - 4) \\ &= 10000 - 400 + 300 - 12 \\ &= 10000 - 112 \\ &= 9888\end{aligned}$$

(vi) 34×36

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We can express 34 as $30 + 4$ and 36 as $30 + 6$

Now let us simplify

$$\begin{aligned}34 \times 36 &= (30 + 4)(30 + 6) \\ &= 30(30 + 6) + 4(30 + 6) \\ &= 900 + 180 + 120 + 24 \\ &= 1224\end{aligned}$$

(vii) 994×1006

We can express 994 as $1000 - 6$ and 1006 as $1000 + 6$

Now let us simplify

$$\begin{aligned}994 \times 1006 &= (1000 - 6)(1000 + 6) \\ &= 1000(1000 + 6) - 6(1000 + 6) \\ &= 1000000 + 6000 - 6000 - 36 \\ &= 999964\end{aligned}$$



Chapterwise RD Sharma Solutions for Class 8 Maths :

- Chapter 1–Rational Numbers
- Chapter 2–Powers
- Chapter 3–Squares and Square Roots
- Chapter 4–Cubes and Cube Roots
- Chapter 5–Playing with Numbers
- Chapter 6–Algebraic Expressions and Identities
- Chapter 7–Factorization
- Chapter 8–Division of Algebraic Expressions
- Chapter 9–Linear Equation in One Variable
- Chapter 10–Direct and Inverse Variations
- Chapter 11–Time and Work
- Chapter 12–Percentage
- Chapter 13–Profit, Loss, Discount and Value Added Tax (VAT)
- Chapter 14–Compound Interest
- Chapter 15–Understanding Shapes- I (Polygons)

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- Chapter 16–Understanding Shapes- II (Quadrilaterals)
- Chapter 17–Understanding Shapes- III (Special Types of Quadrilaterals)
- Chapter 18–Practical Geometry (Constructions)
- Chapter 19–Visualising Shapes
- Chapter 20–Mensuration - I (Area of a Trapezium and a Polygon)
- Chapter 21–Mensuration - II (Volumes and Surface Areas of a Cuboid and a cube)
- Chapter 22–Mensuration - III (Surface Area and Volume of a Right Circular Cylinder)
- Chapter 23–Data Handling - I (Classification and Tabulation of Data)
- Chapter 24–Data Handling - II (Graphical Representation of Data as Histogram)
- Chapter 25–Data Handling - III (Pictorial Representation of Data as Pie Charts or Circle Graphs)
- Chapter 26–Data Handling - IV (Probability)
- Chapter 27–Introduction to Graphs

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About RD Sharma

RD Sharma isn't the kind of author you'd bump into at lit fests. But his bestselling books have helped many CBSE students lose their dread of maths. Sunday Times profiles the tutor turned internet star

He dreams of algorithms that would give most people nightmares. And, spends every waking hour thinking of ways to explain concepts like 'series solution of linear differential equations'. Meet Dr Ravi Dutt Sharma — mathematics teacher and author of 25 reference books — whose name evokes as much awe as the subject he teaches. And though students have used his thick tomes for the last 31 years to ace the dreaded maths exam, it's only recently that a spoof video turned the tutor into a YouTube star.

R D Sharma had a good laugh but said he shared little with his on-screen persona except for the love for maths. "I like to spend all my time thinking and writing about maths problems. I find it relaxing," he says. When he is not writing books explaining mathematical concepts for classes 6 to 12 and engineering students, Sharma is busy dispensing his duty as vice-principal and head of department of science and humanities at Delhi government's Guru Nanak Dev Institute of Technology.

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